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CAVITY PREPARATION FOR DECIDUOUS TEETH

CHARLES A. SWEET, D.D.S.
Oakland, California

SHARP cutting instruments, new burs, and handpieces that are in perfect condition are absolutely essential to lessen the time necessary to prepare a cavity as well as to minimize pain. All instruments should be within easy reach and as much accomplished with each instrument as possible before a change is made.

Class I Cavities

Instruments—The following instruments are needed: (a) numbers 33½, 35, and 37 inverted cone burs for contra-angle handpiece; (b) numbers 700 and 702 tapered fissure burs for contra-angle handpiece; (c) numbers 5 and 7 round bur for contra-angle handpiece; (d) number 43 S. S. White mounted stone for contra-angle handpiece; (e) 10-6-12 right and left spoon excavators (small); and (f) 15-8-12 right and left spoon excavators (medium).

Type A—Beginning Caries—1. With a number 33½ inverted cone bur placed in the contra-angle handpiece, the carious pit is entered and all faulty or precipitous grooves are carried out to smooth enamel areas (Fig. 1).

2. A number 35 inverted cone bur is placed in the contra-angle handpiece, and the grooves are enlarged (Fig. 2).

3. This is followed with a number 700 tapered fissure bur further to widen the grooves.

4. The smoothness of enamel is obtained by tilting the handpiece to the buccal and lingual around the periphery of the cavity.

5. Any remaining caries is removed with a number 5 round bur or the 10-6-12 spoon excavators.

Type B—Deep-Seated Caries—1. The number 33½ inverted cone bur in the contra-angle handpiece (Fig. 3) is used for all faulty or precipitous grooves beginning just below the dento-enamel junction in the carious area.

2. This is followed by the number 35 inverted cone bur to enlarge the grooves.

3. If further enlargement is considered advisable by the operator, this is accomplished with a number 37 inverted cone bur.

4. The outline form of the carious area is best extended with a number 43 S. S. White mounted stone or a number 702 tapered fissure bur in the contra-angle handpiece.

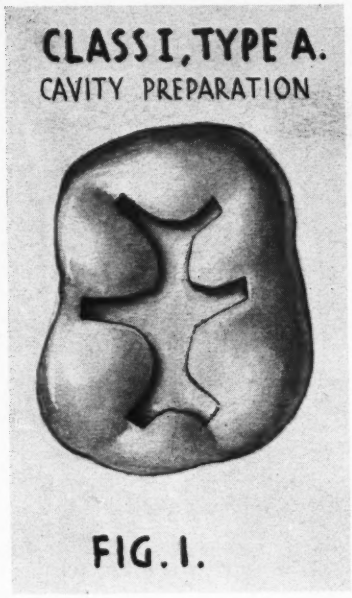


FIG. 1.

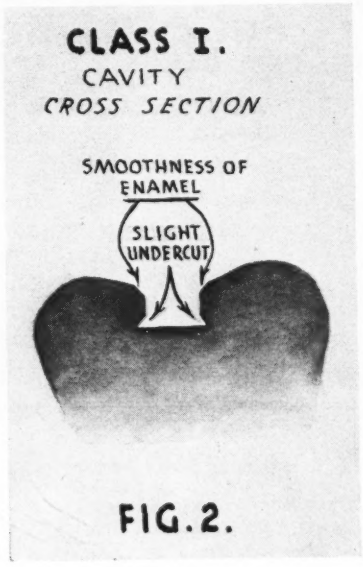


FIG. 2.

5. By tilting the handpiece to the buccal and lingual, the smoothness of enamel is given the periphery of the cavity.

6. All remaining caries is then removed with the number 5 or 7 round bur and sharp 15-8-12 excavators, even though the pulp may be exposed.

Class II Cavities

Instruments—The following instruments are used for Class II cavities; (a) number 1 round bur; (b) numbers 33½, 35, and 37 inverted cone burs for contra-angle handpiece; (c) numbers 700 and 702 tapered fissure burs for contra-angle handpiece; (d) numbers 5 and 7 round burs for contra-angle handpiece; (e) 10-6-12 right and left spoon excavators (small); (f) 15-8-12 right and left spoon excavators (medium); (g) 15-8-6 biangle chisel.

Occlusal Step—1. An opening is made in sound tooth structure in one of the pits with a number 1 round bur in the contra-angle handpiece to a depth slightly below the dento-enamel junction.

2. A straight cut is next made from this pit into the proximal carious area with a number 33½ inverted cone bur.

3. This cut is then widened with a number 35 inverted bur.

4. With a number 37 inverted cone bur in the contra-angle handpiece the occlusal step is fully prepared. The operator should cut no deeper than just below the dento-enamel junction, so that the finished preparation of the occlusal step will follow the inclined planes of the cusps. In this way, the horns of pulp under the buccal and lingual cusps will not be endangered (Fig. 4).

It may be emphasized that the greatest width of the occlusal step must be at the junction of the occlusal with the proximal.

5. This occlusal step should be undercut the depth of the cutting blades of the number 37 inverted cone bur, or five tenths of a millimeter.

6. If additional bulk of filling material is desirable, a deeper cut is made with the number 37 inverted cone bur in the central portion of the step, the exact width, and a depth of about one-half the cutting blades of the number 37 bur. This will not endanger the pulp of the tooth.

Proximal Preparation—1. Overhanging enamel on the buccal and lingual are chipped off with a 15-8-6 biangle chisel.

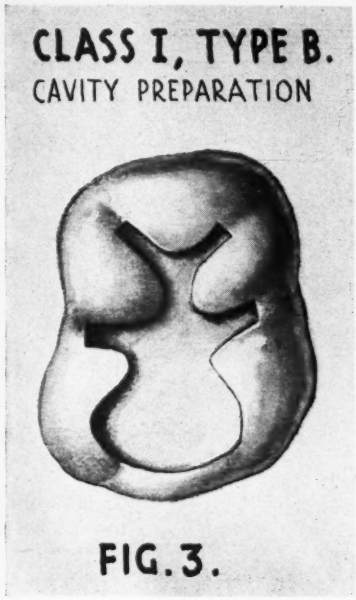
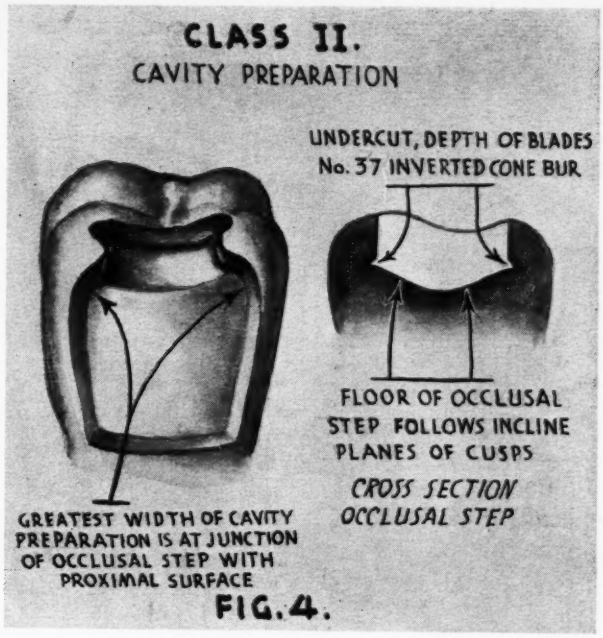


FIG. 3.


CLASS II.
CAVITY PREPARATION
UNDERCUT, DEPTH OF BLADES
No. 37 INVERTED CONE BUR
FLOOR OF OCCLUSAL STEP FOLLOWS INCLINE PLANES OF CUSPS
CROSS SECTION OCCLUSAL STEP
GREATEST WIDTH OF CAVITY PREPARATION IS AT JUNCTION OF OCCLUSAL STEP WITH PROXIMAL SURFACE
FIG. 4.

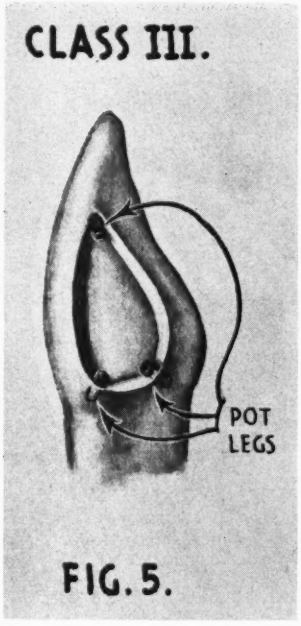
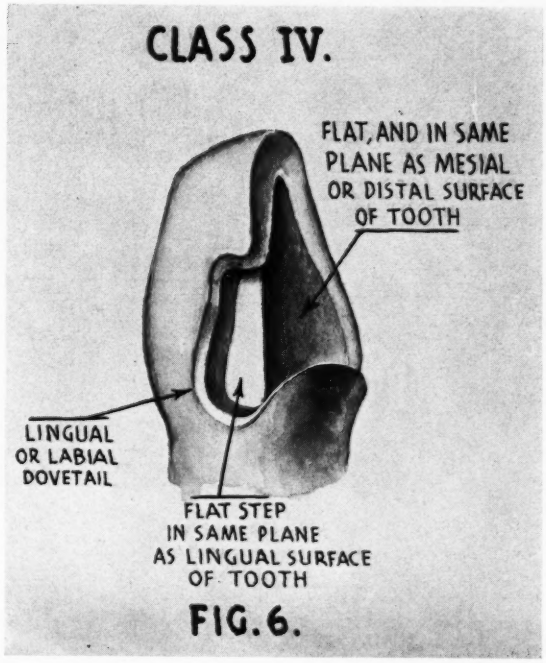


FIG. 5.


CLASS IV.
FLAT, AND IN SAME PLANE AS MESIAL OR DISTAL SURFACE OF TOOTH
LINGUAL OR LABIAL DOVETAIL
FLAT STEP IN SAME PLANE AS LINGUAL SURFACE OF TOOTH
FIG. 6.

2. With the number 37 inverted cone bur still in the contra-angle handpiece, the gingival floor is prepared; the bur is moved back and forth until sound tooth structure has been reached.

The operator should not attempt to square up the bucco-gingival and linguo-gingival angles to a level of the center of the gingival margin, for caries always penetrates deepest in the center portion of the proximal surface, unless it is a very shallow cavity. The gingival floor should be no deeper pulpally than the width of the cutting blades of the number 37 inverted cone bur. The bur is drawn up the buccal and lingual margins from the gingival, the interproximal embrasures being enlarged.

3. All carious dentine is removed, even if the pulp is exposed, with 15-8-12 right and left spoon excavators or number 5 or 7 round bur.

4. With the number 702 tapered fissure bur in the contra-angle handpiece the buccal and lingual embrasures are evened up, and the smoothness of enamel is made by tilting the handpiece and running the number 702 fissure bur around the periphery of the cavity.

Class III Cavities

Instruments—Class III cavities require the following instruments: (a) numbers 33½ and 35 inverted cone burs for straight handpieces; (b) 10-6-12 right and left spoon excavators; (c) a 15-8-6 biangle chisel.

Technique—Class III cavities are

(*Continued on page* 153)

BLOOD DYSCRASIAS AND THEIR RELATIONSHIP TO THE ORAL CAVITY

IRVING SALMAN, D.D.S.
New York

Pernicious Anemia

SORENESS of the tongue is one of the early symptoms of pernicious anemia and often persists long after treatment and in cases in which, apparently, there is a normal blood count. The symptoms of a tongue in pernicious anemia simulate those of Moeller's glossitis or Hunter's tongue which according to textbooks is described as a rare disease with an unknown etiology, occurring chiefly in women. Prinz[1] states that Moeller considered the glossitis to be associated chiefly with gastro-intestinal disturbances. Prinz, on the other hand, says that Moeller's glossitis is a concomitant symptom of some disturbance of normal blood. From his observations and after careful analysis of reported cases, Prinz has found this particular disturbance of the tongue to be present as an early symptom of pernicious anemia or in anemias that may be secondary expressions of some other malady, such as the presence of tapeworm, hookworm, sprue, pellagra, or oral sepsis.

Prinz states that in 75 per cent of cases of pernicious anemia, Moeller's glossitis is present as a specific leading symptom and in about 50 per cent the glossitis constitutes the earliest recognizable evidence of this disease.

The tongue primarily has a burning sensation. This is aggravated on irritation caused by changes in temperature and contact with seasoned or salty foods. The pain varies from mild discomfort to an excruciating pain that makes eating unbearable. The pain is chiefly felt at the anterior two thirds of the tongue and particularly the tip. This pain may be either constant or paroxysmal in character. The pain is thought to be caused by superficial excoriation of the epithelium, leaving the nerve endings covered by a thin layer of epidermis.

Another oral symptom in pernicious anemia is the color change of the mucous membrane. The entire mucous membrane is pale and colorless. The lips are pale and the skin has a pale, waxy appearance. Petechiae are rarely found in the oral mucous membrane. Prinz made an interesting observation of the color change of the soft palate. The soft palate in anemia

[1] Prinz, Herman: Chronic Superficial Erythematous Glossitis (Moeller's Glossitis), D. Cosmos, 70: 483-492 (May) 1928.

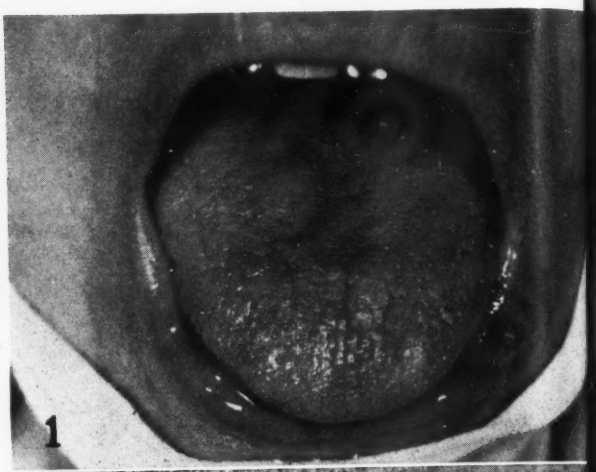


Fig. 1—Typical appearance of tongue in pernicious anemia. The tongue is smooth. Pain is chiefly at the anterior two thirds of the tongue. (Patient from Oral Surgery Clinic, New York University, College of Dentistry.)

Fig. 2 — The smooth tongue of a syphilitic patient. This is differentiated from the smooth tongue in pernicious anemia by its accompanying sclerosing glossitis and sometimes leukoplakia. (Patient from Montefiore Hospital.)

Figs. 3 and 4—Geographic tongue is readily differentiated from the tongue in pernicious anemia. The tongue is generally free from pain and has characteristic margins. These margins vary from time to time. Figs. 3 and 4 are of the same patient photographed several days apart. Commonly called wandering rash.(Patient from Montefiore Hospital.)

is pale and colorless, with, at times, a peculiar greenish-yellow tint. This discoloration is confined to the soft palate from the line of demarcation of the hard palate extending backward in the form of semicircle to the posterior curve of the soft palate. Neuda[2] has observed color changes of the soft palate in other diseases, such as gallbladder and liver disease, duodenal ulcer and pancreatic disease. He has explained this color change as a sequence of a change in water-fat content of the soft tissues with a mild infiltration of absorbed urobilin. Prinz says that this important color change together with Moeller's glossitis is pathognomonic in well established cases of pernicious anemia.

The smooth denuded tongue in which is present pernicious anemia (Fig. 1) should be differentiated from the smooth tongue that occurs as a result of senile atrophy or the bald tongue found in pellagra. Here the tongue is swollen, dry and denuded. The smooth tongue found in syphilitic patients invariably is accompanied by a sclerosing glossitis (Fig 2). The geographic tongue, on the other hand, is readily diagnosed by its characteristic margins, and is generally painless (Figs. 3 and 4).

Fordyce and MacKee[3] state that according to Wise, there is a persistent, recurring mild but annoying stomatitis in early pernicious anemia; however, these investigators have not yet found any evidence that this stomatitis occurs.

Polycythemia

Polycythemia is characterized by a marked increase of red blood cells. Sometimes the count is as much as twelve million. Bleeding of the gums is a frequent occurrence (Fig. 7). Rosenthal[4] believes that the bleeding is due to thrombi formed by these numerous red blood corpuscles in the terminal endings of the blood vessels.

Leukemia

The involvements of the lymphatic organs in leukemia may also include those in the mouth. Hyperplasia of lymphatic structures of the tongue, pharynx, and tonsils may be present. Lymphatic leukemia gives rise to curious nodular swellings of the gums in about 5 per cent of the cases; the gums may even cover the teeth. Leukemia should be differentiated from scurvy and hypertrophic gingivitis. In lymphatic leukemia the gums are hypertrophied; the surface is nodular and irregularly raised; the periosteum is not affected and does not bleed readily. The upper and lower jaws are almost equally affected. In the myologenous type of leukemia there is more tendency to bleeding gums (Fig. 5).

In scurvy the mucous membrane becomes swollen and is painful; however, the pronounced swelling is confined to one fourth of an inch of free gum margin. The gums bleed easily

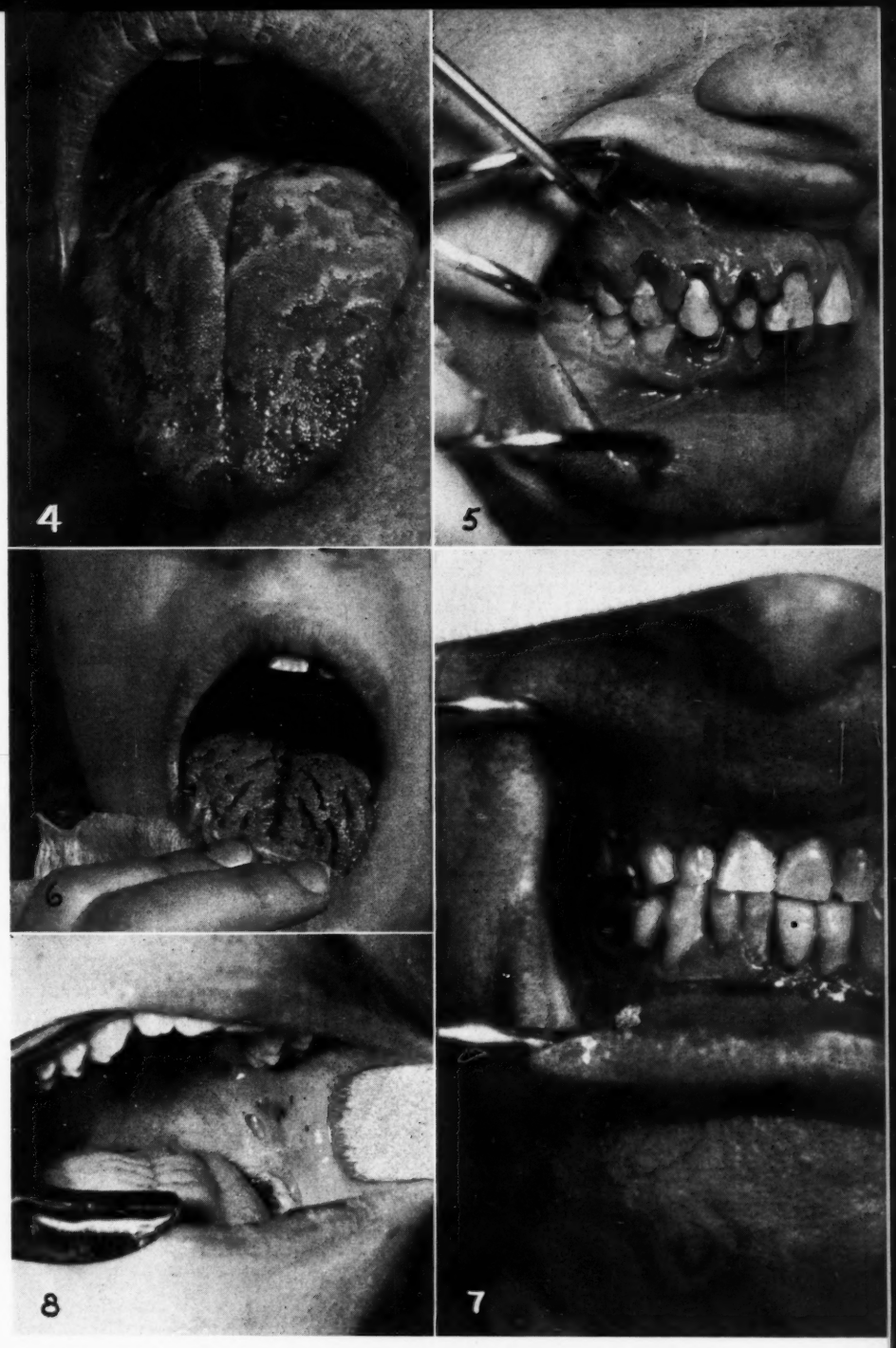


Fig. 5—Myologenous leukemia. There is a greater tendency for bleeding of the gums in this type of leukemia than in the lymphatic leukemias. Courtesy of Doctor Sidney Sorrin, The Dental Digest, November, 1932.

Fig. 6—Scrotal or furrowed tongue; wandering rash or the smooth tongue of pernicious anemia might be seen in patients with this type of tongue, but it is not a concomitant symptom. Scrotal tongue is a congenital condition.

Fig. 7—Patient with polycythemia. Bleeding of the gums is a frequent occurrence in this type of patient. Courtesy of Doctor Sidney Sorrin.

Fig. 8—Petechial spots on cheek. This patient is a hemophiliac. Petechial spots are also frequently seen in purpura hemorrhagica. (Patient from Montefiore Hospital.)

[2] Neuda, Paul: The Soft Palate as a Place for Signs of Disease, Med. J. & Rec. 123: 219-220 (February) 1926.

[3] Fordyce and MacKee: Diseases of the Oral Mucosa, Arch. Dermat. May, 1926, pages 601-642.

[4] Rosenthal, N.: Better Dentistry Meeting, Pennsylvania Hotel, New York, December, 1933.

on injury and there is a marked fetid breath. The periosteum is involved and the teeth become loose. There are hemorrhages not only from the mouth but the nose, throat, and other mucous membranes, and blood is present in the stools.

As the disease of the lymphatic leukemia advances, large sloughing areas and gangrenous stomatitis may be present. Often this condition is accompanied by a secondary form of Vincent's infection, and is, therefore, frequently mistaken for Vincent's infection.

Report of Case

A girl, aged 14, was referred to New York University College of Dentistry for diagnosis and treatment. The patient had a large sloughing mass on the palate, alongside of an upper first molar; this mass was the size of a quarter (25 mm.).

An amalgam restoration had been made three days prior to the patient's visit to the clinic. The restoration extended lingually on the upper first molar.

The area had the appearance of an arsenic necrosis. After consultation with her dentist who said the tooth was vital, arsenic was ruled out as a cause.

Smears showed positive Vincent's organisms; however, the general picture of a Vincent's infection was not present, the remaining mucous membrane being normal. The following day the patient returned with enlargement of the tonsils; the throat was almost occluded. The temperature was 102° F. by mouth.

The patient was hospitalized, and a differential blood count was advised. No count was taken, however. A diagnosis was made of Vincent's infection. The patient improved and was discharged three days later after treatment for Vincent's infection.

Two days later the patient was readmitted to the hospital with marked gangrenous ulcerations about the mouth.

A differential blood count was taken and a diagnosis was made of acute lymphatic leukemia. The patient died one week later.

Pupura Hemorrhagica

Spontaneous and capillary bleeding due to submucous hemorrhages characterizes purpura hemorrhagica. Petechial purpuric spots are frequently seen. These spots are reddish or purplish in color, flat and smooth to touch. There is bleeding from gingival margins. No pain or symptoms are generally associated with these patches.

Agranulocytosis

This is an important subject and recently a great deal of interest has been given to it. There have been to date numerous classifications of this disease. Appleton[5] suggests that the term agranulocytosis should be considered as a symptom rather than a clinical entity. Kracke[6], on the other hand, says that agranulocytosis is a distinct clinical entity. This disease has a definite clinical course, with definite signs, symptoms, and a characteristic blood picture.

The main characteristics of the blood picture is a severe leukopenia with a disappearance of the granulocytes. Most of these cases are fatal. The patients have an acute onset, chills, fever; malaise; ulcerative and necrotic lesions of the mouth and, particularly, the throat. These necrotic lesions simulate Vincent's infection and there may even be a secondary Vincent's infection present; however, the general systemic symptoms present far outweigh the local symptoms. These lesions are secondary and not primary. The high incidence of oral infection is a result and not the cause of granulopenia. It seems that these oral lesions will be more likely to develop in a diseased or neglected mouth than in a healthy one.

Rosenthal[7] states that few cases are relatively benign. Here it is probable that the oral lesions are primary, with some inhibitive or toxic action on the bone marrow.

The etiology of the primary granulopenia or agranulocytic angina is unknown. Numerous causes are known, however, for the secondary granulopenia or toxic granulopenia which has a direct toxic action on the bone marrow. These are chemical poisoning with benzol, arsenic, and arsphenamine. Recent experimentations, chemically and in the laboratory, point to the drugs of the benzene ring; the action of radium and X-ray; certain blood diseases, as pernicious anemia; and infectious diseases, such as influenza, typhoid, and malaria. Sometimes in Hodgkin's disease, the use of the X-ray in its treatment may produce a marked reduction in leukocytes.

There have been numerous cases reported in the literature of cases of granulopenia in which the clinical onset was preceded by the administration of drugs of the benzene ring. Hoffman, Butt, and Hickey[8] reported a series of fourteen cases of neutropenia following the use of amidopyrine. Thirteen of these cases were fatal; every patient of this series had ingested amidopyrine prior to the illness. The one patient who recovered had ingested dinitrophenol for reducing purposes without the advice of a physician. The recovery followed roentgen therapy and the administration of pentnucleotide. Their work points to amidopyrine as having a definite effect on myeloblastic tissue similar in man and in rabbits and they suggest the benzene ring as a common factor in the etiology of granulopenia.

Davidson and Shapiro[9] report an interesting case of neutropenia following the use of dinitrophenol under direction of a physician. While at no time was there an absence of granulocytes the neutrophils were completely missing on the second day of admission to the hospital. Under treatment of pentnucleotide and leukocyte cream the white cells increased from its low count on May 10 from 925 white cells to 11,400 white cells on May 21, and from 0 per cent of neutrophils to 65 per cent.

Kracke[6] has made an interesting observation of the incidence of this disease, which points to the chemical action of benzene ring drugs as an etiologic factor in agranulocytosis. The disease has been reported in all classes of people, more prevalent in persons of leisure. Although there is no age limit, it chiefly occurs in middle-aged women. The ratio of women to men is four to one. This disease is most prevalent in Germany and America where in the past ten years there has been a rapid devolopment and wide use of organic chemical compounds. Most patients give a previous medical history of treatment with drugs of the benzene ring. The condition is seldom seen in the Negro, and Kracke states that Negroes are less susceptible to benzene poisoning than white people.

Eight patients out of nine studied by Kracke had been taking drugs of the coal tar derivatives prior to clinical onset. The drugs used were phenacetine, amidopyrine, peralga, and dial. Kracke took these proprietary preparations and gave one to each of four rabbits by way of mouth for forty-five days. None of these drugs produced any depression of the leukocyte count; however, benzene has been shown for many years to be capable of producing a marked depression of the leukocyte count to the point of complete agranulocytosis.

Removal of Teeth

When teeth are to be removed, I feel that not enough time is spent by the dentist in his examination of the patient. I do not mean examination of the tooth or teeth to be extracted, but the failure in careful observation of the oral mucous tissues and in obtain-

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[5] Appleton, J. Jr.: Agranulocytosis. D. Cosmos, 74: 267-276 (March) 1932; 74: 371-382 (April) 1932.

[6] Kracke, R. R.: Experimental Production of Agranulocytosis, Am. J. Clin. Path. January, 1932, pages 11-30.

[7] Rosenthal. N.: Hematological Aspects of Agranulocytosis and Other Diseases Accompanied by Extreme Leucopenia. Am. J. Clin. Path. January, 1931, pages 7-32.

[8] Hoffman, A. M.; Butt, E. M., and Hickey, N. G.: Neutropenia Following Amidopyrine, J.A.M.A. 102: 1213-1214 (April 14) 1934.

[9] Davidson, E. N. and Shapiro, M.: Neutropenia Following Dinithophenol with Improvement After Pentnucleotide and Leukocyte Cream, J.A.M.A. 102: 480-482 (August) 1934.

ing a history from the patient often proves disastrous. I have seen teeth removed in areas of carcinomatous infiltration without the knowledge of whether the growth had been irradiated or not; an irreparable injury resulted. I have seen teeth removed during acute and subacute Vincent's infections. If by examination the dentist finds the presence of skin petechiae, or the patient gives a history of hemorrhages from the nose or other parts of the body, this should serve as an indication for caution. The patient should be referred to a physician for examination and a complete blood count. Advice should be sought before any surgical intervention is attempted.

In anemias, when extractions are absolutely necessary, one should be prepared to control hemorrhages. Occasionally the removal of a tooth might be the first indication that that patient is a hemophiliac. While it is said that the true hemophiliac patients are males only, we sometimes encounter "bleeders" in both sexes. The best method for controlling hemorrhages from a tooth socket is by direct pressure. The socket should be packed tightly. If a patient returns twenty-four or forty-eight hours later with a secondary hemorrhage, the tissue should be anesthetized; the remaining blood clot from the socket removed, and the socket packed tightly. Bleeding may not always be from the socket. Sometimes the bleeding is from the soft tissues surrounding the socket. By buccal and lingual pressure of the soft parts against the bone the free flow of blood can be controlled. In persistent bleeding, a modeling compound splint over gauze placed on a socket packed with gauze will produce additional pressure on the parts.

57 West Fifty-Seventh Street

CAVITY PREPARATION FOR DECIDUOUS TEETH

(*Continued from page* 149)

made accessible by using the numbers 33½ and 35 inverted cone bur in the straight handpiece. The operator must take advantage of all slight undercuts but should not encroach pulpally deeper than the cutting blades of the bur (Fig. 5).

1. With the 33½ inverted cone bur a small pit or pot leg is placed at the linguo-gingival and labio-gingival angles parallel to the pulpal wall.

2. A small pot leg is also placed at the incisal angle.

3. All remaining caries is removed with the 10-6-12 right and left spoon excavators even if the pulp is exposed. A smoothness of enamel is obtained by using the 15-8-6 biangle chisel.

Class IV Cavities

Instruments—Numbers 33½ and 35 inverted cone burs for contra-angle handpiece; 170-6-12 right and left spoon excavators, and 15-8-6 biangle chisel are used for Class IV cavities.

Technique—To have a satisfactory cavity preparation in Class IV cavities, advantage must be taken of the lingual dovetail for the upper teeth or the labial dovetail for the lower teeth.

1. With a number 33½ inverted cone bur in the contra-angle handpiece, a cut is made in the central portion of the labial or lingual surface, from the proximal cavity to the median line of the tooth, *only* as deep as the cutting blades of the bur (Fig. 6).

2. This original cut is extended *entirely gingivally* with a number 35 inverted cone bur in the contra-angle handpiece. In order to obtain width to the labial or lingual dovetail, the cut should always be carried to or below the gingival margin of the gum tissue. The greatest width to the dovetail should be at its junction with the proximal cavity. Do not cut this dovetail deeper than the cutting blades of a number 35 inverted cone bur.

3. The proximal portion of the cavity is now prepared as the Class III cavity with the number 33½ and 35 inverted cone burs in the contra-angle handpiece, but the incisal pot leg is omitted, as it would perhaps dangerously undermine the incisal edge.

Class V Cavities

Instruments—Numbers 33½, 35, and 37 inverted cone burs; 10-6-12 right and left spoon excavators, and 15-8-6 biangle chisel are used in Class V cavities.

Technique—These cavities are entered with a small inverted cone bur and are gradually enlarged to a reasonable size. The operator should take advantage of the slight undercuts caused by the cutting blades of the inverted cone burs in order to secure sufficient retention.

All remaining caries is removed with the 10-6-12 right and left spoon excavators. The smoothness of enamel is obtained by using the 15-8-6 biangle chisel.

242 Moss Avenue.

THE IMPORTANCE OF PHONETICS IN FULL DENTURE PROSTHESIS

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I WOULD define a successful denture as one in which its three cardinal factors (mechanics, esthetics, and phonetics) are so completely and perfectly harmonized that the patient not only can chew his food properly, but experiences equal satisfaction from its contribution to his facial expression and speech. I have frequently found that even in the case of mechanically satisfactory dentures some improvement in their esthetics was fully able to meet the patient's complaint of not being able to chew well. Furthermore, I feel that many patients who find fault with the mechanics of a denture are taking advantage of the one factor about which the patient alone is really the last judge—his ability to eat with the artificial set of teeth. The displeasing appearance of a denture when seen in the mirror by the patient and the difficulty of making oneself easily understood in speaking help to exaggerate in the patient's mind the difference in efficiency between his lost natural dentition and the artificial substitute. Because he believes the denture is a total failure, he is readily convinced that he cannot chew with it either. Such situations, in which the denture is really as satisfactory as it can be from the standpoint of mechanics, can be remedied by more careful attention to the esthetics, or by a deeper concern for the phonetic requirements, or both.

In order to accomplish this, we must have a fundamental knowledge of phonetics; we must know where sounds originate; how they are formed; by what organs they are affected one way or another; where and how they are modified. In other words, we must have a fundamental knowledge of the physiology of speech.

Voice

Voice is produced by a blast of air which sets the vocal cords into vibration and comes out through the oral cavity. The blast of air is formed by the contraction of the abdominal muscles and muscles of the thorax. The amount of contraction of these muscles and the ability to control them play an important part in singing. But when we study phonetics we are concerned primarily with the changes that the blast of air undergoes while passing through the oral cavity. The quality of phonetics will be greatly influenced by the condition of the nasal and frontal sinuses and the maxillary sinus. This phase of phonetics will be discussed later in connection with defects of speech in cases of cleft palate.

For the present we will concern ourselves with the part the lips, cheeks, alveolar process and teeth play in phonetics, particularly the part the tongue plays in its relation to all these adjacent and associated structures when it performs the duty of directing, interrupting, and completely stopping the blast of air in the oral cavity.

Division of Sounds

Sounds are divided into two main groups: vowel sounds and consonant sounds. The vowel sounds are continuous, whereas consonants are sounds that are produced by a more or less sudden check of the blast of air as it comes out of the larynx; this in turn is caused by closure of some part of the pharynx or mouth.

Vowel Sounds

The vowels A E I O U are produced by a series of regular vibrations with the tongue remaining on the floor of the mouth in contact with the alveolar process and lower teeth.

If we should set the lower anterior and posterior teeth off the ridge lingually, we would crowd the tongue out from the floor of the mouth, and furthermore, the tip of the tongue would come prematurely in contact with the lingual surfaces of the lower teeth. This would create a handicap in the pronunciation of the vowel sounds. The handicap would be greater with the pronunciation of the U sound because with the production of this sound the tongue moves perceptibly forward more than in the pronunciation of the other vowels.

For the production of the three vowel sounds A O U, a single cavity is formed by the lips, tongue, and palate. This single cavity is widest (or mouth is most open) with the A sound; narrower (or mouth is less open) with the O sound; the narrowest (or the mouth is least open) with the U sound (Figs. 1, 2, 3).

For the production of E and I sounds the oral cavity is divided into two distinct parts by the dorsum of the tongue in contact with the soft palate, in the post-dam area. In this way two cavities are formed: one between the anterior portion of the tongue and hard palate, and the other cavity between the soft palate and the base of the tongue. With the pronunciation of E and I, the blast of air escapes through both cavities, anterior and posterior, and there are two notes produced simultaneously, one in each cavity (Figs. 4 and 5).

Establishing Maxillo-Mandibular Opening—The pronunciation of the A sound may be helpful in establishing the maxillo-mandibular opening in full denture work. In average normal cases the distance between the incisal edges of the upper and lower anterior teeth in pronouncing the A sound should be 2 cm.

Determining Junction of Hard and Soft Palate—The "Ah" sound can be utilized to advantage in determining the junction of the hard and soft palate for the purpose of post-damming upper dentures. When "Ah" is pronounced abruptly several times, on looking into the mouth, we see the soft palate rising and falling; this is how the post-dam area is determined.

Fig. 1—In pronouncing the A sound the tongue is situated on the floor of the mouth in contact with the alveolar process and lingual surfaces of the lower teeth. Note the degree of jaw separation with the pronunciation of this sound.

Fig. 2—In pronouncing the O sound, the relationship of the tongue to the teeth and alveolar process remains the same as in Fig. 1, but the degree of jaw separation is smaller.

Fig. 3—In the production of the vowel sound U, as well as with the A and O a single cavity is formed by the lips, tongue, and palate. The degree of jaw separation is smallest with the pronunciation of this vowel sound.

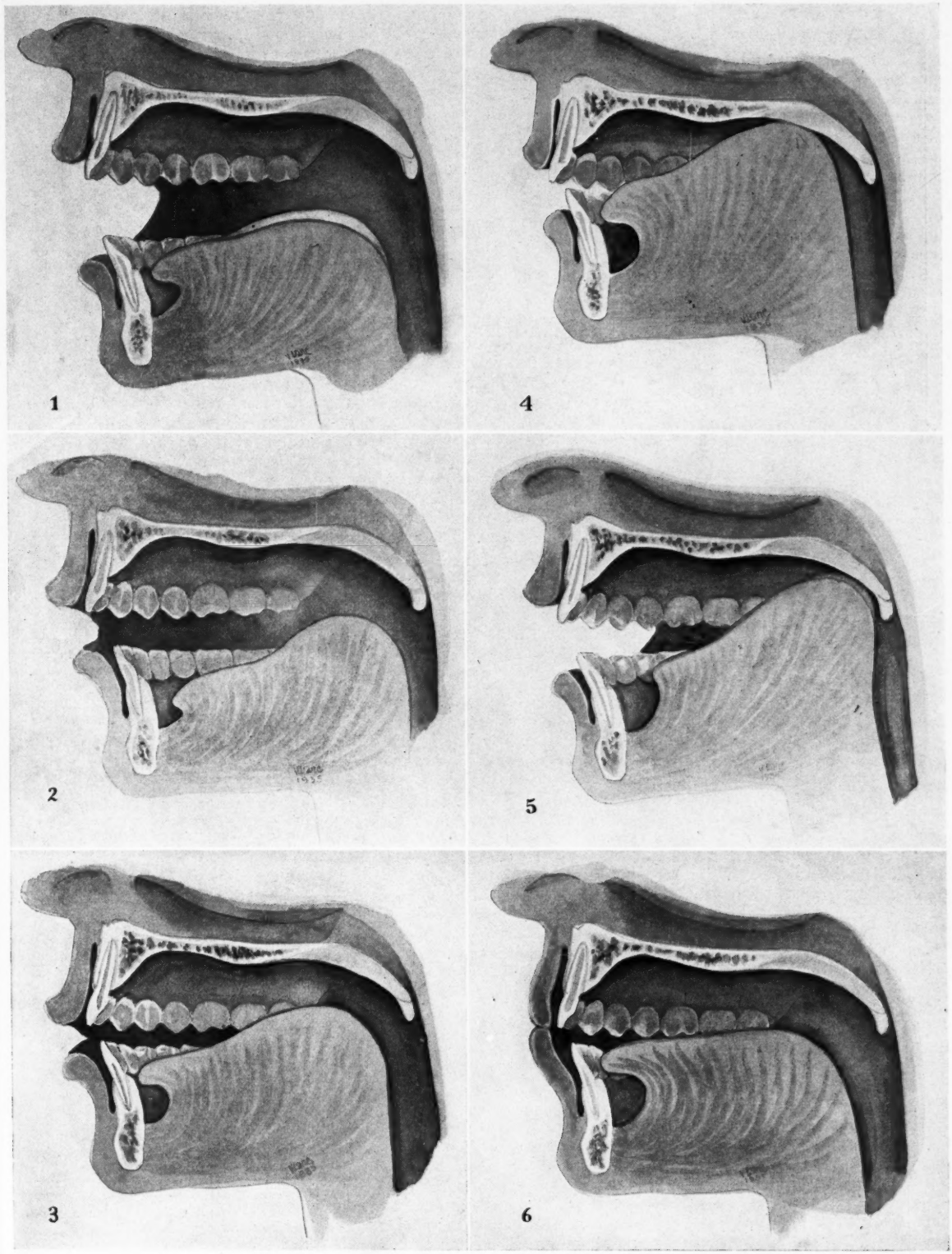


Fig. 4—In pronouncing the E sound the dorsum of the tongue comes into contact with the soft palate in the region of the postdam area. In this way two cavities are formed: one between the anterior portion of the tongue and the hard palate, and the other cavity between the soft palate and the base of the tongue.

Fig. 5—In the production of the I sound the dorsum of the tongue is also in contact with the soft palate, but slightly more distally. With the pronunciation of either E or I the blast of air escapes through both cavities, anterior and posterior.

Fig. 6—In the production of P and B sounds, the lips are brought into active contact and then opened with suddenness. This sudden opening of the lips is responsible for the explosive effect of these sounds. The explosive effect is greater with the pronunciation of the P sound than it is with the B sound.

Consonant Sounds

The consonant sounds are by far the more important ones from the dentist's point of view, because the sudden interruption of the current of air from the lungs usually takes place in the oral cavity. In this way we can study the intimate relationship between the position of the teeth and the adjacent tissues in the formation of consonant sounds.

For convenience of studying, the consonants are divided into:

1. Labials: those that are mainly formed by the lips.
2. Labio-dentals: those that are formed by the lips and teeth.
3. Linguo-dentals: those that are formed by the tongue and teeth.
4. Palato-linguals: those formed by tongue and palate:
   (a) tongue and anterior portion of hard palate;
   (b) tongue and posterior portion of hard palate;
   (c) tongue and soft palate.
5. Nasal sounds.

Labial Group

Labial sounds B and P are formed mainly by the lips, because the blast of air coming from the lungs meets with no resistance along its entire path until it reaches the lips. The lips being forcibly closed and then opened with suddenness, B and P sounds are produced with an explosive effect. The explosive effect is greater with the pronunciation of the P sound than it is with the B sound. This is due to the fact that the lips are in more active contact and the opening of the lips is more sudden with the production of the P sound than it is with the B sound. Examples: Paper, poultice; bread, butter (Fig. 6).

Test for Maxillo-Mandibular Opening—These consonants can serve as a test for the maxillo-mandibular opening. If the maxillo-mandibular opening is excessive, the patient will not be able to bring the lips together comfortably. On the other hand, if the maxillo-mandibular opening is insufficient, the lips will come in contact prematurely. The comfortable pronunciation of the P and B sounds will also depend on the position of the upper and lower anterior teeth in their relation to the ridge. They should not be set off the ridge too much labially or lingually, especially in the labial direction for this particular sound, because this forces the lips to assume a forward position which brings about an incorrect pronunciation of these sounds.

The M sound also belongs to the labial groups, with the essential difference that part of the air blast escapes through the nose, which makes a nasal sound out of it. With the pronunciation of the M sound, the lips part and come together, but their coming together is not a forcible one, as in P and B, but a passive one which brings the lips into passive contact with each other.

The W sound could also be considered as a labial sound and could be interpreted as a sound V following an H sound; i.e., H plus V equals W. The H sound represents a blast of air that comes from the chest and passes through the oral cavity without being changed in the least.

Determining Degree of Jaw Separation—The W sound could serve as a good test for the determination of the proper degree of jaw separation. In pronouncing the W the mouth is wide open, as for instance: *wonder where, wonder when, wonder why*. On looking into the patient's mouth when he is pronouncing those words, we can get an idea as to whether the degree of jaw separation is excessive, correct, or insufficient. If the degree of jaw separation is correct, the distance between the upper and lower teeth in pronouncing these words would be between 2 and 2.5 cm.

Labio-Dental Group

Labio-dental sounds are those that are formed by the lips and teeth. The F and V sound are the chief representatives of this group: They are pronounced by raising the lower lip and bringing it into contact with the incisal edges of the upper anterior teeth, curling over the labial surface of these teeth from 1 to 2 mm. (Fig. 7). Examples: 55, 44, *frank, valve, vulture, veteran*. To this group also belongs the Ph combination, such as in *Philip, philosophy*.

Determining Plane of Occlusion—The phonetic test with this group is particularly useful in determining the proper plane of occlusion in full denture work. In average normal cases, the pronunciation of F, V, and Ph sounds should bring the lower lips into contact with the incisal edges of the upper anterior teeth. If, therefore, the upper anterior teeth were set too far below the proper plane of occlusion, the lower lip would come in contact prematurely with the incisal edges of the upper anterior teeth, and cause discomfort to the patient. On the other hand, if the upper anterior teeth were set too far above the proper plane of occlusion, the lower lip could not reach the incisal edges of the upper and anterior teeth, and thereby cause the sounds to be incorrect. A person whose upper anterior teeth are excessively long or short cannot pronounce the F sound correctly, because to produce the sound properly the lower lip must come in contact with the incisal edges of the upper anterior teeth; the tip of the tongue must be pressed against the lingual surfaces of the lower teeth, and the lateral margins of the tongue must be in contact with the alveolar processes and molars, thereby directing the blast of air between the lower lip and upper anterior teeth.

Determining Labio-Lingual of Upper Anteriors—This group could also serve as a test for the determination of the labio-lingual position of the upper anterior teeth. If these teeth are set too far forward, the lower lip will place itself on their lingual surface, thereby causing discomfort. If on the other hand, the upper anterior teeth are set too far lingually, the lower lip cannot reach the incisal edges of the upper teeth, and the sounds cannot be pronounced correctly.

Lingual-Dental Group

The consonant Th is the typical representative of the lingual-dental

Fig. 7—In the production of F, V, and Ph sounds, the lower lip is brought into contact with the incisal edges of the upper anterior teeth; then the lips curl over the labial surface of the upper teeth to the height of from 1 to 2 mm. These labio-dental sounds could serve as an excellent test for the determination of the proper plane of occlusion.

Fig. 8—In pronouncing the Th sound the tip of the tongue is placed between the incisal edges of the upper and lower anterior teeth, and the adjacent parts of the tongue are pressed against the lingual surfaces of the anterior teeth. When the tongue is retracted the Th sound is pronounced with an explosive effect.

Fig. 9—In the production of the T and D sounds the tip of the tongue is pressed firmly against the anterior portion of the hard palate and when the tongue is suddenly depressed downward, T and D are pronounced with an explosive effect. This could serve as a good test in full denture prosthesis. If the anterior palatal portion of the upper denture is too thick, the patient would have difficulty in pronouncing these sounds. It also often shows the futility of trying to reproduce pronounced artificial rugae in full denture work, for these pronounced rugae will often interfere with phonetics.

Fig. 10—S, Z, and C: These sounds are produced by placing the tip of the tongue slightly in contact with the most anterior portion of the hard palate; the lateral margins of the tongue come into slight contact with the lingual surfaces of the posterior teeth. The mandible is in a protruded position and the air is forced through with a hissing sound when the channel formed between tongue and palate is narrow and slit-like anteriorly. If the anterior portion of the channel formed by tongue and palate is round or oval, whistling will result. If the air channel is completely obstructed anteriorly, the tip of the tongue being pressed against the rugae, and the air is forced to escape on both sides of the tongue, then the S will sound like Sh.

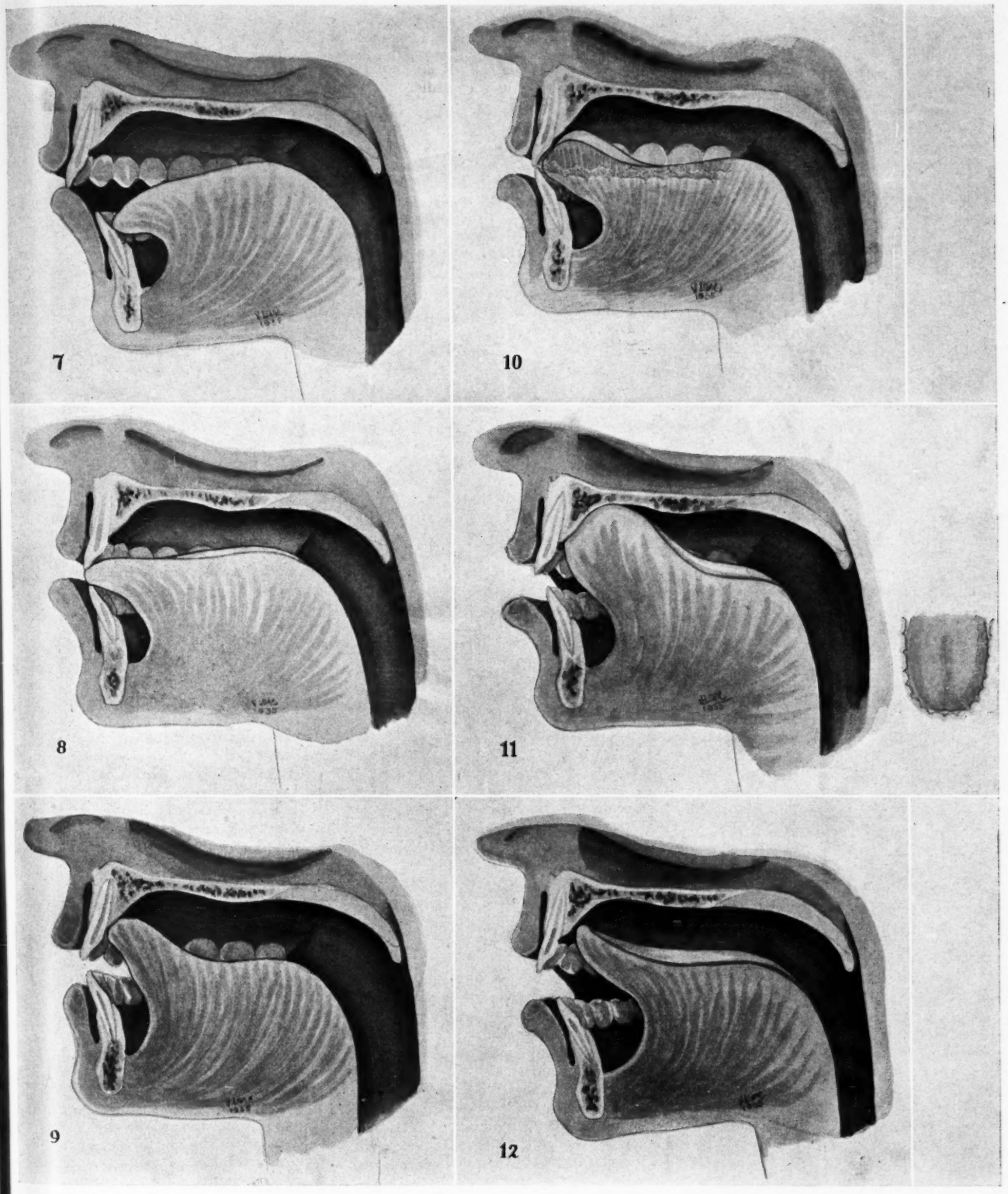


Fig. 11—Ch and J: In order to pronounce these sounds the tongue must cover a great part of the hard palate in the region of the rugae. In addition to that the tip and lateral margins of the tongue press against the alveolar process of the maxillary teeth. The sound is produced when the tongue is suddenly depressed.

Fig. 12—R: The R sound is produced by the lateral margins of the tongue coming in contact with the alveolar process and the upper molar teeth. The tip of the tongue is then in contact with the anterior portion of the palate. The blast of air throws the tip of the tongue into vibration, thus producing the R sound.

group. In pronouncing the Th sound, as in *thunder, thoughtful, thorough,* the tip of the tongue is placed in between the incisal edges of the upper and lower anterior teeth, and pressed against them so that the air cannot escape from the oral cavity. When air is forced into the channel formed by the palate and the dorsum of the tongue, the tip of the tongue is retracted into the oral cavity, and the air escapes with an explosive effect through the opening formed by the retraction of the tongue (Fig. 8).

"Th" Tests—The consonant Th may serve as a test in two ways: (1) If the degree of jaw separation is excessive, the tip of the tongue will remain pressed against the lingual surfaces of the upper and lower anterior teeth, and the Th will sound almost like T. (2) In the same way, if the upper and lower anterior teeth are set too much off the ridge in the lingual direction, the patient will have difficulty in pronouncing the consonant Th. This is due to the fact that while the tip of the tongue is placed in between the anterior teeth, the adjacent part of the tongue is pressed against the lingual surfaces of the upper and lower teeth, and also partly against the linguo-gingival margin of the upper anterior teeth. For this reason we should avoid making linguo-gingival margins of artificial dentures too thick.

Palato-Lingual Group

The palato-linguals are those formed by the tongue and palate. This group comprises a great number of sounds and is divided into those formed by the tongue and the anterior portion of the hard palate: T D S C (soft like in city) Z R. In pronouncing T and D sounds the tip of the tongue is placed firmly against the anterior portion of the hard palate, and when the tongue is suddenly depressed downward, T and D are pronounced with an explosive effect. Example: *downtown, tiptoe.* If, therefore, the artificial dentures are too thick in the anterior portion of the hard palate or if the rugae are too pronounced, the patient would have great difficulty in pronouncing these sounds, because the tongue would contact prematurely with this portion of the hard palate (Fig. 9).

In pronouncing S, Z, and C (soft like in city) the tip of the tongue comes in contact slightly with the most anterior portion of the hard palate and to the same slight extent with the lingual surfaces of the upper and lower teeth. Example: 66, *Mississippi, city, cedar, zeal, zebra.* The incisal edges and cusps of the upper and lower teeth are almost in contact, being separated from one another only from 1 to 2 mm. It follows that people wearing full dentures are apt to have difficulty in making the S, C, and Z sounds. If the upper or lower teeth, or both, are set off the ridge lingually, a lisping effect will be produced. This is due to the fact that the tongue comes in contact prematurely with the lingual surfaces of these teeth. If, on the other hand, the palatal surface of the denture is too thick, the same lisping effect will result, owing to the fact that there is not enough room for the tongue, and the narrow slit-like air channel between tongue and palate anteriorly is obstructed.

Test for Degree of Jaw Opening—The fact that the occlusal surfaces of the upper and lower teeth almost come into contact when S, C, and Z are pronounced may be utilized as a good test for determining the proper degree of opening of the jaws. If the degree of jaw separation is excessive, the cusps of the teeth will come into premature contact with one another, causing a clattering of the teeth.

If, on the other hand, the degree of jaw separation is insufficient, too much air will escape from the mouth and the S sound will resemble the Sh sound. S, C, and Z sounds should be tested carefully in full denture work (Fig. 10).

To this same group also belong those sounds which require contact between the tongue and the posterior part of the hard palate. Strictly speaking that does not mean that the contact is limited to the posterior portion of the hard palate, without at all touching the anterior portion of the palate. It would be, in my opinion, more accurate to say that in the sounds to follow, the tongue comes in contact with the hard palate on a wider area than in the previous palatal-lingual sounds.

The sounds Ch, Sh, and J will be considered now. In order to pronounce these sounds the tongue covers a great part of the palate in the region of the rugae. In addition to that, the tip of the tongue and the lateral margins of the tongue press against the alveolar process of the maxillary teeth. When the tongue is suddenly depressed, the air escapes from the mouth with an explosive effect. In this manner, the Ch and J sounds are produced. The Sh sound is produced similarly, however, without an explosive effect, because the air escapes while the tongue is still in contact with the palate (Fig. 11). Example: *churches, chicken, Joseph, Jordan.*

Test for Thickness of Palatal Portion of Denture—If a denture were constructed properly from every angle, except that the palatal portion of that denture in the region of the rugae were made too thick, the phonetic test with Ch and J sounds would disclose it at once. The patient will not be able to pronounce these sounds correctly. The reason the patient is handicapped in pronouncing these sounds is that the tongue does not have sufficient room in the region of the rugae because of the excessive thickness of the denture.

Reproducing Rugae—It has been my experience that in a majority of cases, rugae reproduced on the palatal portion of artificial dentures are either detrimental or useless to the patient. They are detrimental because invariably the denture is made thicker than it should be in that region for the sake of making the rugae esthetically correct. This in turn interferes with phonetics because it takes away valuable space from the tongue. Even in those cases in which the patient does not seem to suffer from the artificial rugae and excessive thickness of the denture associated with it, we will find that the patient will not miss them when we grind them away with a stone and polish the surface thoroughly. In these cases, the rugae are useless but the patient becomes accustomed to them. I know this is a radical statement to make, because of the generally accepted opposite view that rugae should always be reproduced in artificial dentures. I cannot, however, help making the statement that rugae in artificial dentures should, except in certain rare cases, be avoided. For instance, I would consider it advisable to reproduce the rugae in an upper gold partial denture in which the bite was opened and additional space was thus provided for the tongue. In this instance, the contact effected between the tongue and the anterior third of the hard palate will be so slight that it ought not to interfere with phonetics. But even in these cases the dentures should be tested carefully from a phonetic standpoint, and under no circumstances, should the rugae be too pronounced.

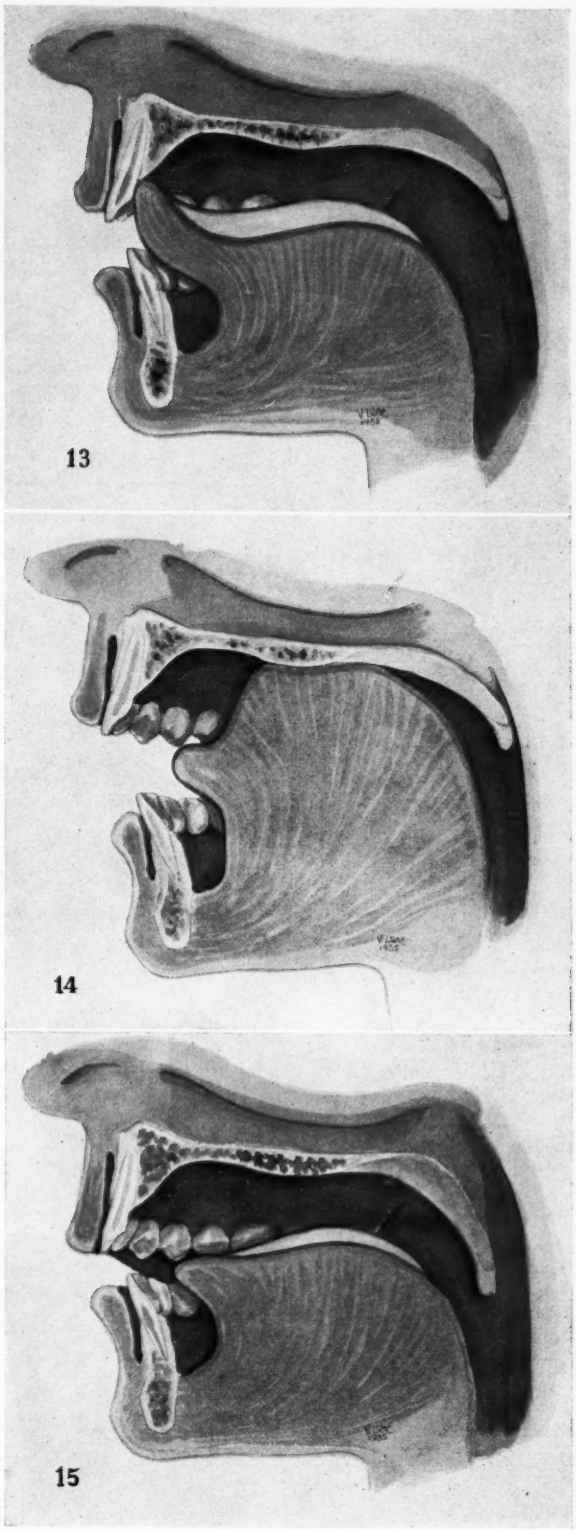
To the palatal-lingual group also belong the R and L sounds. The R sound is produced by the lateral margins of the tongue coming in contact with the alveolar processes and the upper molar teeth, and the tip of the tongue coming in contact with the anterior portion of the palate. When a blast of air is thrown upon the tongue, the tip of the tongue begins to vibrate, thus producing the R sound (Fig. 12).

The L sound is produced by the application of the lateral margins and the tip of the tongue to the upper

Fig. 13—In the production of the L sound, the tip and lateral margins of the tongue are applied to the alveolar process of the upper teeth lingually. The tip of the tongue is pressed forcibly against the process and the air escapes through two openings in the region of the upper first molars producing the L sound.

Fig. 14—K, G, and C (hard, like in cat): These sounds are produced by the contact of the base of the tongue with the soft palate. When the tongue is pressed downward, the air escapes with an explosive effect, producing these sounds. If the posterior border of the upper denture is overextended, or is too thick in the region of the post-dam area, the patient may have difficulty with the pronunciation of these sounds.

Fig. 15—M, N, and NG: The essential characteristic in the production of the nasal sounds consists in the fact that when they are produced, part of the air escapes through the nasal passages, because the soft palate does not completely separate the oral from the nasal cavities.



alveolar processes. The tip of the tongue is then pressed forcibly against the processes in the lingual region of the upper anterior teeth, the air escaping through two openings in the region of the first molars into the vestibulum oris and thence into the air, producing the L sound (Fig. 13).

The Tongue and Soft Palate Group—To this group belong K G NG C (hard like in *cat* or in *carrot*) sounds. The production of these sounds is accomplished by the base of the tongue being raised upward and directed backward until the tongue comes into contact with the soft palate. A complete stoppage of the air is effected in this manner. When the tongue is pressed downward the air escapes with an explosive effect, producing these sounds (Fig. 14).

Nasal Group

As a separate group we could consider the nasal consonants, M, N, and NG. These consonants belong, in turn, as we have seen, to different groups: M belongs to the labial group; N belongs to the palatal-lingual group: the tip of the tongue coming in contact with the anterior portion of the hard palate; and NG belongs to the palatal-lingual group: the base of the tongue coming into contact with the soft palate. The essential characteristic of the nasal sounds consists in the fact that when they are produced, part of the air escapes through the nasal passages, because the soft palate does not completely separate the oral from the nasal cavities as in the formation of all other sounds (Fig. 15). In the formation of all sounds, except the nasal group, the soft palate is drawn upward and backward, and the pharynx is raised upward and forward. An intimate contact is in this way effected, between the soft palate, and the posterior wall of the pharynx, which completely shuts off the nasal cavities from the oral cavity. The sounds produced in this manner are clear and distinct, without the admixture of any nasal resonance. When sounds of the nasal group are produced there is an opening left between

the soft palate and posterior wall of the pharynx; part of the air blast enters the nares, imparting the typical nasal resonance to these sounds.

It is clear from the foregoing how handicapped patients with cleft palates are in speech. Where there is a great deal of destruction of the hard and soft palate, all the air blasts used in the production of all sounds escape through the nasal cavities and the patient cannot make himself understood. The patient with cleft palate is unable even to produce the sounds of the nasal group; i. e., M, N, and NG, because he cannot control the amount of air that should escape through the nasal cavities.

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Conclusion

It is understood that by dividing the consonants into the groups described, we have in mind average normal cases. The phonetic tests as described would not apply to cases in which deviation from the normal is pronounced. But even for average normal cases, the description given so far tends to bring out the most important position of the tongue and its relationship to the adjacent and associated structures for a given sound.

It should be borne in mind that besides these primary important positions, the tongue also assumes other positions which are of importance in phonetics. When, for instance, we pronounce S, Z, C (preceding E and I) Ch, T, D, Th, the tongue, besides its main positions, also comes in contact with the lingual surfaces of the upper teeth and their processes. In some of these sounds the tongue also covers the occlusal surfaces of the upper and lower teeth, as in Th and Ch. We hope future research in phonetics will throw light on the production of certain sounds about which our knowledge is incomplete at the present time.

ABOUT OUR CONTRIBUTORS

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Weston A. Price, D.D.S. (University of Michigan, 1893; M.S., 1913) began his studies included under the title Why Dental Caries With Modern Civilization? in the March, 1933, number of The Dental Digest, and carried them through August, 1933; the second series, from February to July excluding May, 1934. The present compressed article in two installments concludes the studies in this magazine. Doctor Price's complete professional biography appeared in March, 1933; in April, 1933, he was the subject of a special feature article in which he was described at work in his research laboratories.

Lawrence E. Spear, D.D.S. (University of Minnesota, College of Dentistry, 1927) contributed an article on A New Thermoplastic Denture Technique in the June, 1933, number of The Dental Digest, and his professional biography appeared in that issue.

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WHY DENTAL CARIES WITH MODERN CIVILIZATIONS?

12. Field Studies Among the Polynesians and Melanesians of the South Sea Islands

WESTON A. PRICE, D.D.S., M.S.

Cleveland

IF IT is true that the causative factors for the physical degeneration of mankind are practically the same everywhere, it should be possible to find a common cause operating, regardless of climate, race, or environment.

In the studies previously reported[1] in THE DENTAL DIGEST, the groups represented were living in the northern hemisphere and in the temperate or Arctic zones. To extend the variations in nutrition, the field studies in 1934 were made among races chiefly in the South Sea Islands and tropical zones.

The nutrition of the groups previously studied varied widely. For the people in the high Alps in the isolated valleys, it consisted chiefly of rye and dairy products. These native foods were adequate to produce superb physical development with high immunity to dental caries.[2] For the isolated Gallic people in the Outer Hebrides the native foods were highly efficient. These were chiefly oats and animal life of the sea.[3] For the Eskimos in remote sections of Alaska the local native foods were highly efficient. These were largely limited to products from the animal life of the sea.[4] Practically no fruits and grains were available and few vegetables were to be had. For the Indians of the far north and central Canada the foods were found to be almost exclusively limited to the wild animals of the chase, the organs of which were also eaten.[5] When these people of various racial stock were studied in their contact with modern civilization (which means a displacement of

[1] THE DENTAL DIGEST, from March to August, 1933; from February to July except May, 1934.

[2] Price, W. A.: Why Dental Caries With Modern Civilizations? 1. Field Studies in Primitive Loetschental Valley, Switzerland, DENTAL DIGEST, March, 1933. 2. Field Studies in Primitive Valais (Wallis) Districts, Switzerland, ibid., April 3. Field Studies in Modernized St. Moritz, Herisau, Switzerland, ibid., May.

[3] Price, W. A.: 4. Field Studies in Primitive and in Modern Outer Hebrides, Scotland, DENTAL DIGEST (June) 1934.

[4] Price, W. A.: 10. Field Studies Among Primitive and Modernized Eskimos of Alaska, DENTAL DIGEST (June) 1934.

[5] Price, W. A.: 7. Field Studies of Modernized American Indians in Ontario, Manitoba and New York, DENTAL DIGEST (February) 1934. 8. Field Studies of Modernized Indians in Twenty Communities of the Canadian and Alaskan Pacific Coast, DENTAL DIGEST (March) 1934). 9. Field Studies Among Primitive Indians in Northern Canada, ibid. (April) 1934.

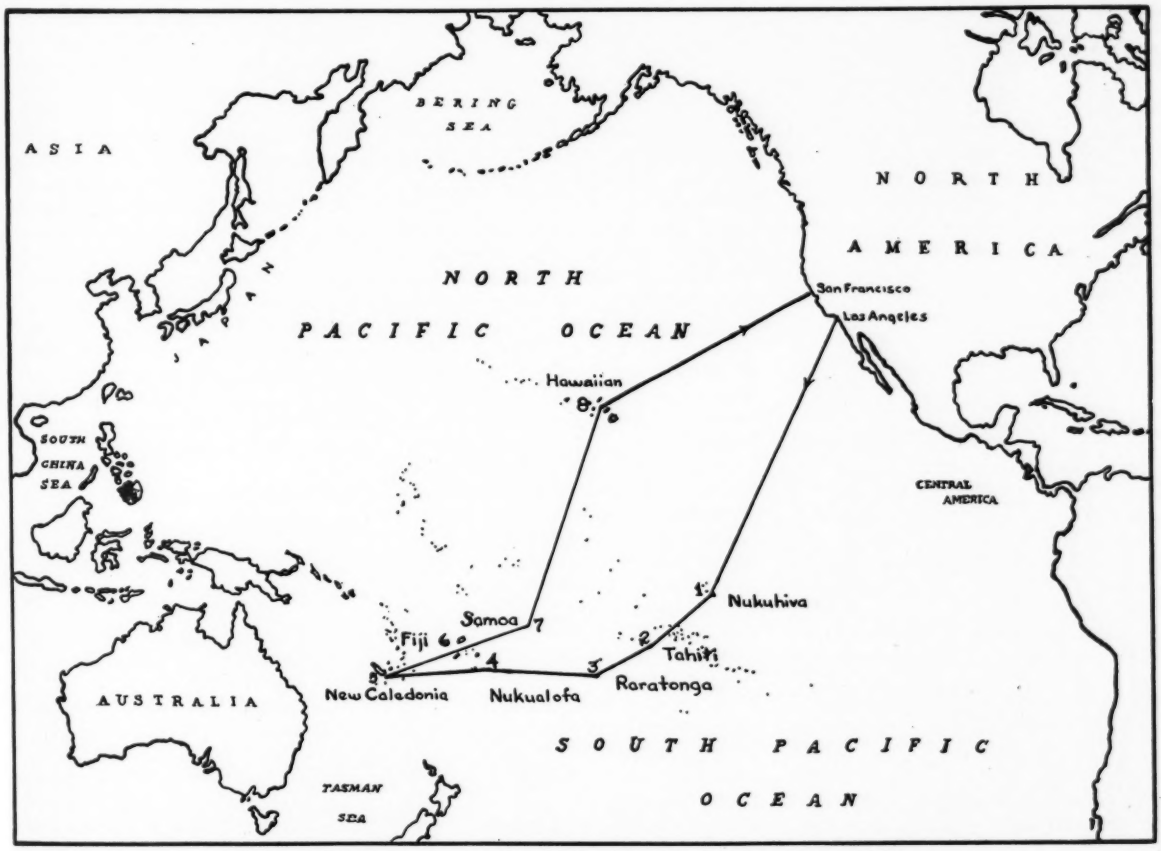


Fig. 1—Map showing itinerary in South Sea Islands for investigations on nutrition.

part of the native foods with imported foods, chiefly white flour and sugar products) there was found to be a rapid lowering of the level of immunity to dental caries and a marked increase in susceptibility to the degenerative diseases. In all succeeding generations a marked increase in susceptibility to tuberculosis was found.

In all these groups, among those living on native nutrition not only was there a high immunity to dental caries (usually only a few teeth per thousand teeth examined had ever been attacked by tooth decay) but also there was a marked uniformity of excellence of physical development, including uniform production of the physical characteristics of the race with regularity of development of the dental arches and facial form. At the point of contact with modern civilization and its foods, however, the first and later generations diverged markedly from the normal physical and facial development. Irregularities of the teeth and dental arches and abnormal intermaxillary relationships similar to those found so often among the people of our modern civilizations were frequent occurrences.

It is to be noted that in these groups previously studied each was found to be using liberally either animal tissues or animal products. It occurred to me, therefore, that it would be interesting to find groups that were accomplishing a high efficiency in body building and a high immunity to dental caries on diets that were limited completely to plant foods. The South Sea Islands were selected for this investigation.

We went South through the more easterly archipelagos; namely, the Marquesas Islands, Society Islands, and Cook Islands and then westward to the Tongan Islands in the southern central Pacific near New Zealand and then westward to New Caledonia near Australia. From this group, we went northward to the Fiji Islands, also in the western Pacific; then to the Samoan Islands in the Central Pacific south of the equator, and then to the Hawaiian Islands north of the equator. This itinerary including eight archipelagos is shown in Fig. 1. These islands were populated by different racial stocks speaking different languages.

Through government officials we were able to reach isolated groups, some in mountainous locations far removed from trade or merchant ships.

When the formalities were once accomplished and our wishes made known, the chiefs instructed the members of their tribes to carry out our program for making examinations, recording personal data, making photographs, and collecting samples of foods for chemical analysis.

The photographic work included the making and developing of more than two thousand negatives in the field. It was necessary that the negatives be developed soon after exposure since the high temperature and high humidity reduced the photographic impressions rapidly, approximately 50 per cent in two weeks' time. This added greatly to the routine difficulties because of the impossibility of obtaining cold water. The night temperature was often over 90 degrees and the daytime often excessively hot and humid.

The food samples were either dried or preserved in solution of formaldehyde.

The detailed records included recording the location, tribe, village and family of every person; his age; previous residence; observations on physical development; the kinds of foods eaten, the physical condition of every tooth; presence or absence of cavities; shape of the dental arches, shape and development of the face, and detailed notes on divergence from racial type. Special physical characteristics were photographed. A comparison was made of these factors for each of the more isolated members of the same tribe and those in the vicinity of the port or landing place of the island. Through the government officials detailed information was secured, usually in the form of the annual government statistical reports showing the kind and quantity of the various ingredients, and articles imported and exported. Whenever possible the health officers were asked to help us in the studies. In many instances the contact with civilization consisted of the call of a small trading ship once or twice a year to gather up the copra or dried coconut, sea shells, and such other products as the natives had accumulated for exchange. Payment for these products was practically always made in trade goods and not in money.

While the missionaries have encouraged the people to adopt habits of modern civilization, in the isolated districts they were not able to depart from their native food because of the infrequent call of the trader ships. In several islands measures had been adopted requiring the covering of the body. This regulation had greatly reduced the primitive practice of coating the surface of the body with coconut oil which had the effect of absorbing the ultraviolet rays, thus preventing injury from the tropical sun. The natives were thereby able to shed the rain which was frequently torrential though of short duration. The irradiation of the coconut oil was considered by the natives to provide an important source of nutrition; whereas wet garments became a serious menace to the wearers' comfort and health.

The early navigators who visited these South Sea Islands reported the people as being exceedingly strong and generally kindly disposed. There were dense populations on most of the habitable islands. In contrast with this, one now finds that the death rate is often far in excess of the birth rate, so that the very existence of these racial groups is in some localities seriously threatened.

Marquesas Islands

The first group studied was the people of the Marquesas Islands which are situated about 4,000 miles due west of Peru. Few if any of the primitive racial stocks of the South Sea Islands were so enthusiastically extolled for their beauty and excellence of physical development by the early navigators. They reported that the Marquesans were vivacious, happy people numbering more than a hundred thousand on the seven principal Islands of this group. A French government official told me that the native population had decreased to less than 5 per cent of the original number, chiefly through the ravages of tuberculosis. Serious epidemics of small pox and measles have at times taken a heavy toll. In a group of approximately one hundred adults and children, I counted ten that were emaciated and coughing with typical signs of tuberculosis. Many were waiting for treatment at a dispensary eight hours before it would be opened. Some of the natives have splendid physiques, fine countenances, and some of the women had beautiful features; but they are a sick and dying primitive group. A trader ship was in port exchanging white flour and sugar for copra. The natives have largely ceased to depend on the sea for food. Tooth decay was rampant in 36.9 per cent of the teeth of the people using trade food in conjunction with the land plants and fruits. There were few natives living entirely on their native foods.

Tahiti

Tahiti is the principal island of the Society group. It is situated 17 degrees south of the equator on the 149th degree of west longitude. Fortunately, degeneration has not been so rapid or so severe here. The population, however, has reduced from more than two hundred thousand as early estimated to a present native population of less than 10 per

cent of that number. These islands are a part of French Oceania. Many of the able bodied men were taken to aid France in the World War; only a small percentage returned and they were for the most part crippled. The Tahitians are a buoyant, light hearted race, fully conscious, however, of their rapid decline in numbers and health.

The capital of Tahiti, Papeete, is the administrative center of the French Pacific possessions. It has a large foreign population and there is considerable commerce in and out of this port. A great deal of imported food is used. Just as on the Marquesa Islands, it was difficult to find large numbers of persons living entirely on the native foods. Those that were found had complete immunity to dental caries. Among the natives living partly on trade foods, chiefly white flour, sugar, and canned goods, 31.9 per cent of the teeth were found to be attacked by tooth decay.

Raratonga

The Cook Islands in the Pacific Ocean are British and under the direct guidance of the New Zealand government. Raratonga is the principal island. It has delightful climate the year round. Racially, according to legend, the Maoria tribe, the native tribe of New Zealand, migrated there from the Cook Islands. In addition to being similar in physical development and appearance, their languages are sufficiently similar so that each can understand the other, even though their separation probably occurred more than a thousand years ago.

Large groups were found in Raratonga living almost entirely on native foods, and it is of interest that only 0.3 per cent of the teeth of these groups have been attacked by dental caries. In the vicinity of Avarua, the principal port, however, the natives were living largely on trade foods and among these 29.5 per cent of the teeth were found to have been attacked by dental caries.

The inhabitants of the three archipelagos, Marquesas, Society, and Cook Islands are Polynesian in origin. Their complexions are tawny but not black. Their hair is straight and their lips are thin. Under British guidance the Cook Islanders have much better health than the Marquesans or the Tahitians. Their population is not seriously decreasing and except for the progressive development of dental disease around the port, they are thrifty and happy and are rapidly developing a local civilization, including a natively supported school system.

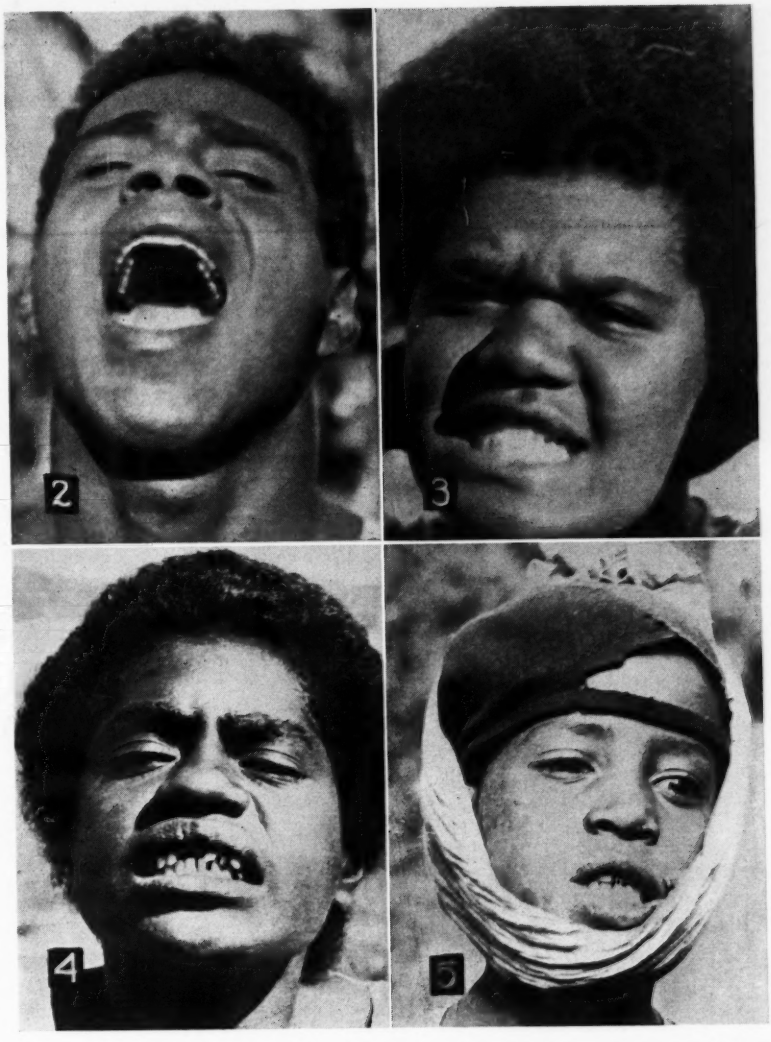


Fig. 2—A typical Melanesian of New Caledonia and Fiji. Note the splendid development of the teeth and the dental arches. Even the third molars can be seen through the open mouth.
Fig. 3—A typical Melanesian woman. Both women and the men have superb physical development. Both have great strength and excellent endurance even though their native life is so easy and simple. They are great lovers of sports.
Figs. 4 and 5—For comparison note the effect of the contact with modern civilization and its foods in such typical cases.

Nukualofa

The inhabitants of the Tongan Islands the principal of which is Tongatabu comprise a native population of about 28,000. They have the distinction of being one of the last absolute monarchies of the world. While they are under the protection of Great Britain, they largely manage their own affairs. Their isolation is nearly complete except for a call from an infrequent trader. They seem to be credited by the inhabitants of the other islands as being the greatest warriors of the Pacific. Ethnologically they are said to be a mixture in the past of the darker Melanesians with their kinky hair and the fairer Polynesians with straight hair. It is said they have never been defeated in battle. For centuries they and the Fijian tribes, seven hundred miles to the west, have frequently been at war. The British government has skilfully directed this racial rivalry into athletics. While we were in the Fiji Islands the British government provided a battle cruiser to carry the football team from Fiji to Nukualofa for the annual contest of strength.

The limited importation of foods to the Tongan Islands because of the infrequent call of merchant or trading ships has required these people to remain largely on their native foods.

The effect of this is shown clearly in the condition of the teeth. The incidence of dental caries of the isolated groups living on native foods was 0.6

per cent; for those around the port living in part on trade foods 33.4 per cent. For a few years following the War while the price of copra was high they traded a considerable quantity for imported foods. The effect of this was clearly to be seen on the teeth of the people who were growing up at that time. Now the trader ships do not call and this forced isolation is clearly a blessing in disguise.

New Caledonia

The Island of New Caledonia is one of the largest in the Pacific. The New Caledonians are pure Melanesian stock. They are broad shouldered and muscular. These islands are under French control and the foreign population is chiefly French who live mainly in the vicinity of the one port of Noumea. These last three archipelagos, The Cook Islands, Tongan Islands, and New Caledonia are far enough south of the equator to have an equable climate the year round. The subjugation of these people has been difficult and as recently as 1917 a band from the interior in protest to efforts to establish a white colony and sugar plantation on a desirable section of coastal land swept down on the French colony in the night and massacred almost the entire population. Their contact with the required foods from the sea had been cut off. They believe that they need to have seafoods to maintain life and physical efficency. The physical development of the primitive people and the development of their teeth and dental arches is of a high order. A comparison of the people living near the ports with those living in the isolated inland locations shows marked increase in the incidence of dental caries. For those living almost exclusively on the native foods the incidence of dental caries was only 0.14 per cent; while for those using trade foods, the incidence of dental caries was 26 per cent.

Fiji Islands

The Fiji Islanders are similar in physical development and appearance to the New Caledonians and are also largely, if not wholly, Melanesian in racial origin. They have kinky hair and broad shoulders. They are not as tall as their hereditary enemies the Tongans of the East, and in order to make themselves look equally large they have adopted the practice of training their kinky hair straight out from the head to a height often reaching 6 inches or more. They are British subjects and while they have had splendid assistance they have suffered greatly from degenerative diseases in the districts near the ports and in those in which sugar plantations have been established.

Since Viti Levu, one of the islands of this group, is one of the larger islands in the Pacific Ocean, I had hoped to find on it a district far enough from the sea to make it necessary for the natives to have lived entirely on land foods. Accordingly, with the assistance of the government officials and by using a recently opened government road, I was able to get well into the interior of the island by motor vehicle, and from this point to proceed farther inland on foot with two guides. I was not able, however, to get beyond the piles of shells of sea-forms which had been carried into the interior. My guide told me that it had always been essential for the people of the interior to obtain some food from the sea and that even during the times of most bitter warfare between the Inland or Hill tribes and the Coast tribes those of the interior would bring down during the night choice plant foods from the mountain areas and place them in caches and return the following night and obtain the seafoods that had been placed in those depositories by the shore tribes. Those who carried the food were never molested, not even during active warfare. The guide told me further that they require to have some food from the sea at least every three months even to this day.

Among the sources of animal foods was the wild pig from the bush. These wild pigs are not native but are imported into nearly all the islands and they have become wild where there is an abundance of food for them. Another animal food was coconut crabs which grow to a weight of several pounds. At certain seasons of the year the crabs migrate to the sea in great numbers from the mountains and interior country. They spend about three days in the sea as part of their reproductive program and return over the same course to their mountain habitats. These routes are almost in straight lines. At that season of the year large numbers of them are captured for food. This crab robs the coconut tree of its fruit. It climbs during the darkness and returns before the dawn. They cut off the coconuts and allow them to drop to the ground. When the natives hear coconuts dropping in the night they put a girdle of grass around the tree 15 or 20 feet from the ground and when the crab backs down and touches the grass he thinks he is down to the ground, lets go his hold, and is stunned by the fall. The natives then collect the crabs and put them in a pen and here they are fed on shredded coconut. In two weeks' time the crabs are so fat they burst their shells. They are then delicious eating. Fresh water is used where available from the mountain streams. Land animal foods, however, are not abundant in the mountainous interior and no places were found where the native plant foods were not supplemented by seafoods.

There has been an extensive development of sugar plantations on the larger islands of several of the Pacific archipelagos. The working of these plantations has required the importation of large numbers of indentured laborers, mostly men. These laborers have been brought chiefly from India and China, and have married native island women. This influx of Asiatics together with that of Europeans has had an important influence on the purity of the native race around the ports. This provided an opportunity to study the effect of intermingling of races on the susceptibility to dental caries. No differences due to ancestry were disclosed by the presence or absence of tooth decay. The incidence of dental caries at the points of contact with imported foods was 30.1 per cent as compared with the more isolated groups who were living on the native foods of land and sea, which was only 0.42 per cent.

(*End of first of two installments*)

NEW BOOKLET ON DENTAL ANATOMY

Russell C. Wheeler, D.D.S., Missouri Building, Saint Louis, has prepared and published a Syllabus on dental anatomy called Tooth Form. The booklet is in a loose-leaf form, lithographed on fine paper, and sells for $1.50. The Syllabus was designed to help teach dental anatomy by illustrating the ideal or composite tooth. Tooth Form provides a standardized illustrated plan for the drawing and carving of teeth. Doctor Wheeler has been teaching dental anatomy for ten years at Washington University.

A NEW TECHNIQUE FOR BOXING IMPRESSIONS

LAWRENCE E. SPEAR, D.D.S.
Minneapolis

SUMMARY

The method of using a pressure-sensitive adhesive on crepe backing is probably the quickest method developed for boxing impressions. A water-tight joint is secured which allows full use of vibration in packing material into the impressions.

Separation of the boxing material from cast or die requires only a few seconds, and the stone surface is clean.

THERE are many times when it is desirable to produce a cast from an impression with as little delay as possible. The patient may be in the chair and a cast is necessary before proceeding further with the work.

The method to be described here is applicable to a copper tube impression for an inlay or an impression for a bridge or denture.

REQUIREMENTS

Each impression is different from any other and has curved surfaces and bulges to which any boxing material must be closely adapted. Furthermore, since vibration is the most efficient manner of packing stone or plaster in an impression, the boxing must be water-tight in order to confine materials flowed into the impressions properly.

MATERIALS

A pressure-sensitive adhesive on a crepe backing answers the requirements and this is the material used. The crepe backing allows the tape to be stretched around curved surfaces with perfect adaptation regardless of the shape of the impression.

TECHNIQUE

In order to obtain vibration for flowing up impressions, a flattened surface is made about one-fourth inch across on the lathe chuck. An off-center stone in the dental engine will accomplish the same purpose.

When a cast is being made for pressing a denture, the stone is mixed as thick as it can be worked in order to obtain maximum hardness. This also holds true for making dies for indirect inlays. With a little practice it is possible to make dies for the most delicate inlays and have them ready in a few minutes.

519 Medical Arts Building.

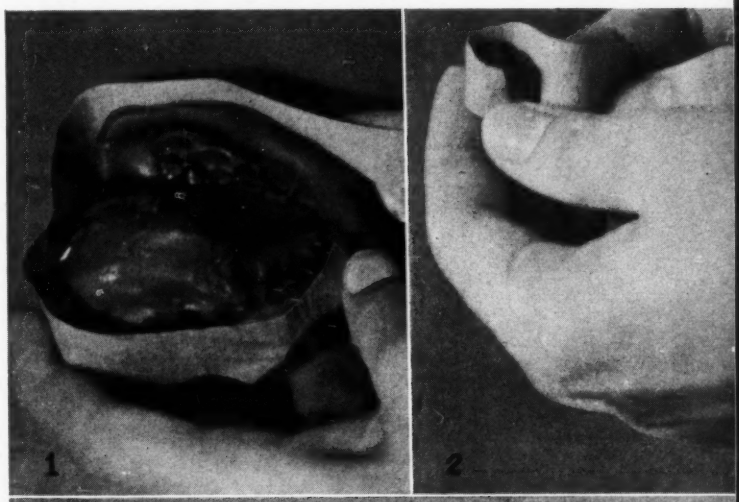


Fig. 1 — Method of pressing tape to place around periphery of impression. The pressure-sensitive adhesive is on a crepe backing which allows it to be bent easily around curved surfaces.

Fig. 2 — Copper tube impressions are wrapped by pressing a small piece of the tape around them. The tape is lapped over a little at the joint.

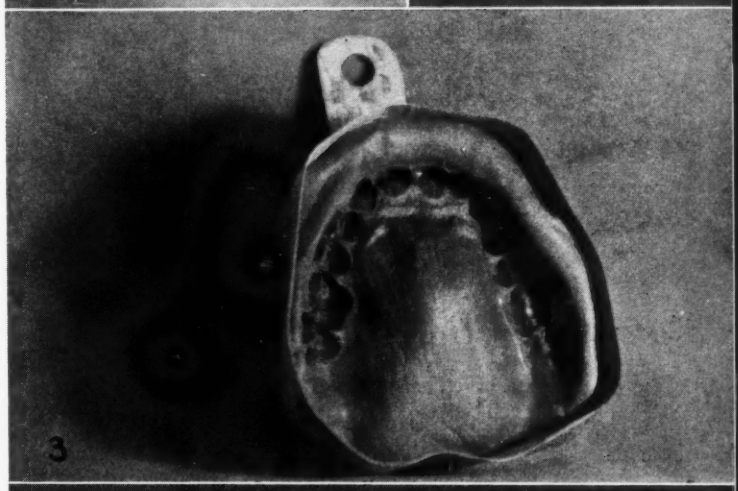


Fig. 3—An upper impression boxed, ready for flowing up with plaster or stone.

Fig. 4—Two views of a lower impression boxed. Note slits in tape made with scissors to facilitate adaptation. Stone will not leak out with vibration when boxed in this manner.

An Adaptation of THE CHILDREN'S CHARTER

FOR EVERY CHILD: i ... spiritual and moral training to help him to stand firm under the pressure of life. ii ... understanding and the guarding of his personality ... iii ... a home and that love and security which a home provides ... iv ... full preparation for his birth, his mother receiving prenatal, natal, and postnatal care ... v ... health protection from birth through adolescence ... periodical health examinations ... care of specialists and hospital treatment; REGULAR DENTAL EXAMINATIONS AND CARE OF THE TEETH; protective and preventive measures against communicable diseases; the insuring of pure food, pure milk, and pure water. vi ... health instruction and a health program, wholesome physical and mental recreation, with teachers and leaders adequately trained. vii ... a dwelling place safe, sanitary, and wholesome, with reasonable provisions for privacy, free from conditions which tend to thwart his development ... viii ... a school which is safe from hazards, sanitary, properly equipped, lighted, and ventilated ... nursery schools and kindergartens ... ix ... a community that recognizes and plans for his needs ... provides him with safe and wholesome places for play ... makes provision for his cultural and social needs. x ... an education which, through the discovery and development of his individual abilities ... prepares him for a living that will yield him the maximum of satisfaction. xi ... such teaching and training as will prepare him for successful parenthood ... for parents, training to fit them to deal wisely with the problems of parenthood. xii ... education for safety and protection against accidents to which modern conditions subject him ... xiii ... who is ... physically or mentally handicapped ... such measures as will early discover and diagnose his handicap, provide care and treatment ... xiv ... who is in conflict with society the right to be dealt with intelligently as society's charge, not society's outcast ... xv ... the right to grow up in a family with an adequate standard of living ... as the surest safeguard against social handicaps. xvi ... protection against labor that stunts growth, either physical or mental, that limits education, that deprives children of the right of comradeship, of play, and of joy. xvii ... in rural districts ... an extension ... of social, recreational, and cultural facilities. xviii. To supplement the home and the school in the training of youth, ... the extension of voluntary youth organizations. xix ... a district, county, or community organization for health, education, and welfare, with full-time officials, coordinating with a state-wide program ...

FOR EVERY CHILD these rights, regardless of race, or color, or situation wherever he may live under the protection of the American flag

FROM "THE CHILDREN'S CHARTER" PREPARED BY THE WHITE HOUSE CONFERENCE IN 1931.

The Editor's Page

AT Runnymede, on June 15, 1215, King John was forced by the English barons to sign a treaty that was a guarantee of rights, privileges, and security. This treaty was the Magna Charta. From it have sprung many of the laws of English speaking people; it served as a guide for the bold words of the Declaration of Independence; it influenced the more conservative language of the Constitution.

In 1931 President Hoover called and directed the White House Conference which formulated the *Magna Charta for American Childhood*: The Children's Charter is made up of nineteen points which provide a framework of ideals of rights for every child. Briefly, The Children's Charter declares that for every child there should be made available a moral and spiritual training to help him resist the stress of life; a home, and that love and security that a home provides; an education, which, through the discovery and development of his individual abilities will prepare him for life and a living that will yield him the maximum of satisfaction; a community that recognizes and plans for his needs; health protection from birth through adolescence.

Under the leadership of President Roosevelt, acting through his Committee on Economic Security, specific plans are proposed to help make practical some of the principles incorporated in The Children's Charter. The following are the major provisions and principles that affect children included in the Report to the President of the Committee on Economic Security:

1. In all the planning for social security the child must be regarded as the core of the purpose and therefore all appropriations must be made with a view to preventing premature strains on childhood. In general, there is nothing wrong with children on relief lists except their parents' lack of money to give them the opportunities otherwise taken for granted.

2. It is recommended in the Report that increased State appropriations and Federal grants-in-aid be made to supplement State and local expenditures to help fatherless children under "mothers' aid" or "mothers' pension laws" which should exist effectively in all states.

3. A small Federal grant-in-aid is suggested to stimulate action to establish adequate State or local child-welfare services on a nationwide basis for dependent and physically and mentally handicapped children in the country.

4. Through the cooperation and agency of the Children's Bureau the Federal Government should launch a nationwide program for child and maternal health: (a) to reduce the maternity mortality rate and (b) extend health services particularly for crippled children in rural districts.

5. There is a need for the extension of a *preventive* public health service on a nationwide basis. (Preventive measures would necessarily begin in childhood.) To this end a ten million dollar appropriation is advised.

The Wagner Bill for Social Insurance, which is generally considered to represent the legislative form of some of the social security ideas, provides, in the field of health, for an annual allocation of four million dollars for maternity and child welfare; of three million for crippled children; of ten million for State public health projects under the supervision of the United States Public Health Service. The last provision includes an appropriation of two million dollars for research and investigation.

The passage of the Social Security Bill and its enactment into law represents, if wisely enforced, a partial fulfillment of the provisions of The Children's Charter.

In the further planning for the health measures, it is to be hoped that the advice of the health professions will be sought and that the professions will be ready with constructive suggestions to cooperate.

PYORRHEA SURGERY FOR THE GENERAL PRACTITIONER

ALBERT E. SANDERS, D.D.S.

Los Angeles

MY FIRST experience with pyorrhea surgery was about eleven years ago. At this time, it was fashionable in dentistry to inject pyorrhea pockets with various patent drugs, fancily named and fancily priced. Some were evil tasting and some were evil smelling; some hurt when applied and some did not; all, I believe, were worthless.

Report of Cases

Case 1—A young woman with large and crowded teeth reported that she could press pus from around a lower right lateral each morning on arising. I treated this tooth by careful scaling, and then applied, one after another, many different kinds of medicaments with absolutely no results. I had read something about pyorrhea surgery and with the patient's permission, I took a lancet and removed the pocket by cutting a semicircular notch of gum tissue about 5 mm. wide. I then touched the bare root with silver nitrate. The pus pocket was thus effectively removed.

This experience in Case 1 encouraged me to try surgical eradication of pyorrhea on a larger scale.

Case 2—A man, walking stiffly, came to my office from a local hospital and handed me a set of roentgenograms. He told me that the physician in charge of his case had advised removal of all his teeth in an effort to cure an arthritic condition.

Oral Examination—Examination of the mouth revealed the presence of pyorrhea in an advanced stage. Several of the lower molars were loose.

Treatment—A complete gingivectomy, one fourth of the mouth being done at a time, produced good results. The patient cooperated faithfully in home care of his teeth.

Subsequent Examinations—The patient returned in six months to my office, still a patient at the sanatorium, and told me that the arthritic condition was no better. On examination I found that even the molars which had been loose had tightened and were clean looking, with a tight ring of healthy gum tissue around them. No pus was present on any of the teeth. Nevertheless, the patient wanted his teeth extracted. I refused to do this, because I felt that there was absolutely no reason for removing his teeth. The mouth, I was sure, was not the source of infection.

Eighteen months later the patient returned for a prophylaxis. He told me the arthritic condition had left him many months before this visit.

Follow-Up—Had the teeth been removed they would have been considered as the cause of the arthritis despite the absence of infection in the gums. It has been about four years since the gingivectomy was done. The patient still has his teeth and there has been no recurrence of the pyorrhea or arthritis.

I am especially interested in pyorrhea surgery for the general practitioner. After all he is the one who sees the great mass of patients. The average general practitioner can be taught in a short time how to do a neat gingivectomy. A great many more general practitioners will do this work once they have learned how quickly and easily the pockets, especially the deep ones, are entirely eliminated with practically no discomfort to the patient. I believe that many cases of pyorrhea, which have been treated by subgingival curettement, have failed, despite attention to the dietary factors and the correction of traumatic occlusion, because subgingival deposits were not entirely planed from the teeth. Complete removal of the deposits is made difficult by the lack of suitable instruments, the difficulty of access, and poor visibility, or a combination of these. The most important of these, perhaps, is poor visibility.

Instruments

My objection to most special instruments for pyorrhea surgery is that they are too radical in their cutting and that the cutting must be done blindly; that is to say, it is difficult to watch the point or cutting edge of the blade as it is operated. To correct this difficulty I have devised a set of four double-ended instruments which will reach and remove all portions of the gums, neatly and cleanly.

These instruments are suited to do a single tooth operation, because with them the operator can draw a line on the gum tissue exactly as he would draw a line with a pencil. The instruments were designed with the idea that an instrument could not be used to cut human tissue and at the same time be a calculus scraper. With these instruments the outline of good alveolar process can be followed in order to leave that which is good and also reduce the pocket to its lowest depth. The Arthur Black and Towner instruments are somewhat similar.

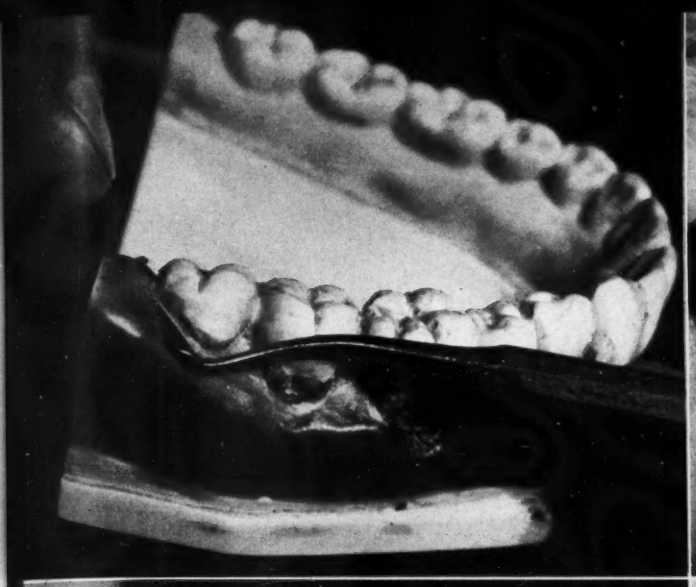
Extent of Bone and Tissue Removal

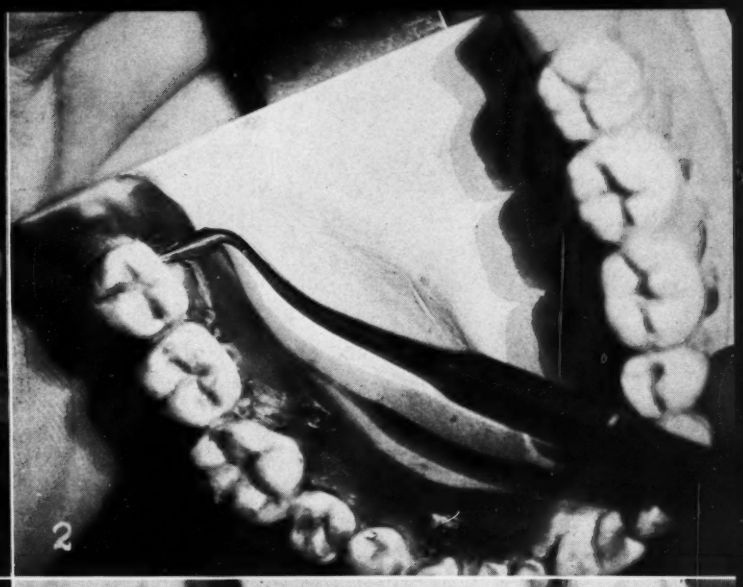
Is it necessary to cut far down into good bone and gum tissue, especially bone, in order to eradicate pyorrhea? Those who do radical pyorrhea operations usually bemoan the fact that most dentists in general practice do not do pyorrhea surgery themselves, and patients who have pyorrhea are asked to come back week after week, sometimes for many months, for the conventional or subgingival curettement treatment, which is prolonged and costly.

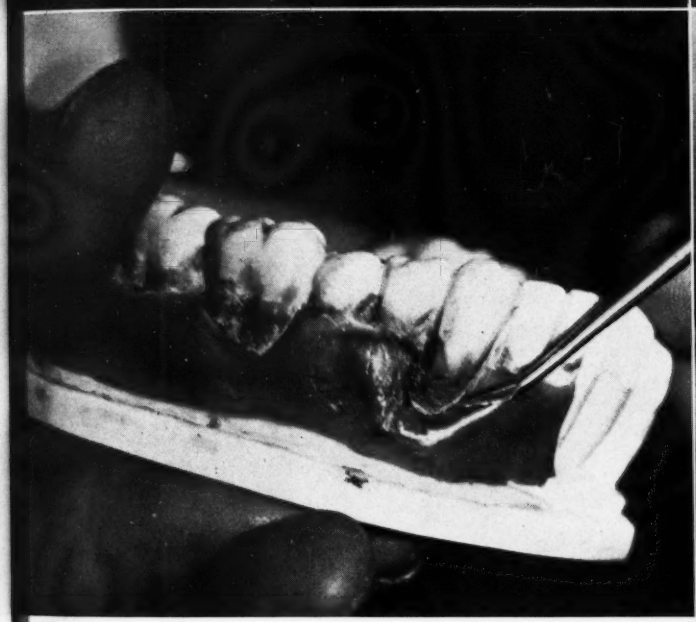
Ward[1] has said that "pyorrheal infection of the jawbones is a true caries, and just like caries of the tooth structure it must be cut back down into sound tissue." This necessity I deny. One cannot compare the nonrecuperative qualities of tooth structure with the recuperative qualities of bony tissue. A broken tooth will not heal. I believe that dentists who do this radical operation do not give the jawbones and the gums an opportunity to use the power living tissue has to recuperate if infected. If we accept this premise as true, how far must one cut in order to eliminate infection in the cancellous portions of the jawbone? I do not believe that incipient pyorrhea should be treated by surgery. This is radical. Moreover, I do not believe that the whole mouth should be done at one time, or that the patient must be taken to the hospital. All these factors have damaged to an immeasurable extent the case for the treatment of pyorrhea by surgery, and have actually created in the minds of the general practitioners to whom I have spoken a distinct aversion to such treatment.

No matter what the method, all operators are trying to get the same result in the treatment of pyorrhea. Doctor Julio Endelman says, "The purpose of treating pyorrhea is to prolong the life of the teeth, assure the continuance of their physiologic and esthetic functions, and also to prevent the absorption of bacteria and bacterial toxins." All dentists agree

[1] Ward, A. M.: Read before the Section on Orthodontia and Periodontia at the Sixty-Ninth Session of the American Dental Association, Detroit, October 26, 1927.







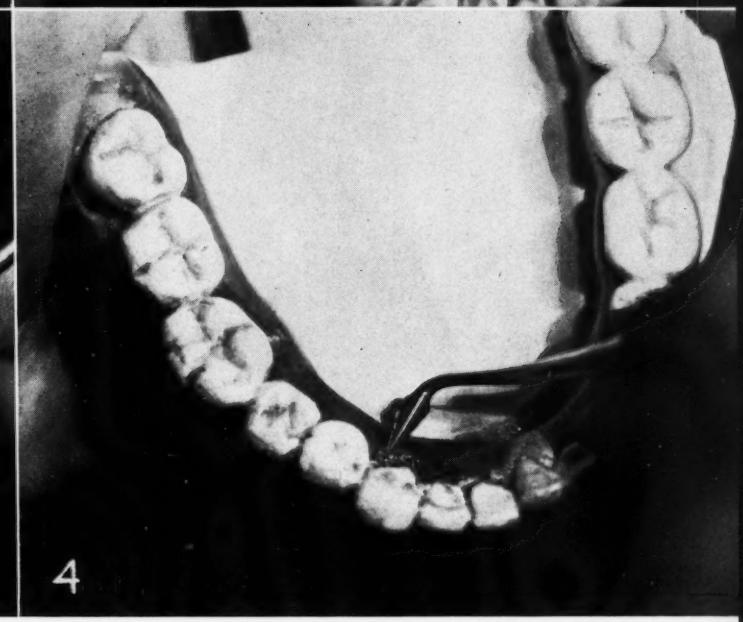


Fig. 1—Instrument 1 is used on the buccal surfaces of the lower molar and bicuspid regions and the lingual of the upper molar and bicuspid regions.

Fig. 2—Instrument 2 is used on the lingual of the lower molars and bicuspids and the buccal of the upper molars and bicuspids.

Fig. 3—Instrument 3 is used on labial of lower cuspid area.

Fig. 4—Instruments 4 and 5 are used on lingual surfaces of the upper and lower anterior teeth.

as to the purpose of treating pyorrhea, and most of them agree as to what constitutes a cure. With this as a starting point, it should not be too difficult to harmonize the different schools of thought in a common basis for treatment.

Coordinate Methods of Treatment

The following procedure is recommended:

1. Good roentgenograms should be taken.

2. Treatment should be instituted if there is any suggestion of Vincent's infection.

3. The entire mouth should be scaled roughly.

4. The patient should be taught the proper method of tooth brushing and gum massage, with proper brushes.

5. Institute such dietary changes as may be needed.

6. The patient should return at intervals of a week or ten days for the operation of each fourth of the mouth. Only those teeth which have definite need of surgical intervention should be included. This preliminary treatment will often eliminate the need for a great deal of surgery.

Advantages in Dividing Operation

It is preferable to do only one fourth of the mouth in one operation because (1) the amount of procaine hydrochloride used is the same as is needed for the extraction of from one to three teeth. (2) The patient may be kept on a regular diet as he always has one side to chew on, which is free from a pack. (3) Someone has computed the number of inches of gum tissue there are in the human mouth. When this gum tissue is badly infected, I do not believe it well to cut into all the tissue at one time, and expose the blood stream to this great amount of infection. (4) The patient is ambulant; in fact, in most cases can go right back to his work with the assurance that when the local anesthetic wears off there will be little discomfort. (5) It is not necessary to subject all patients to opiates as a routine procedure when doing one fourth of the mouth at a

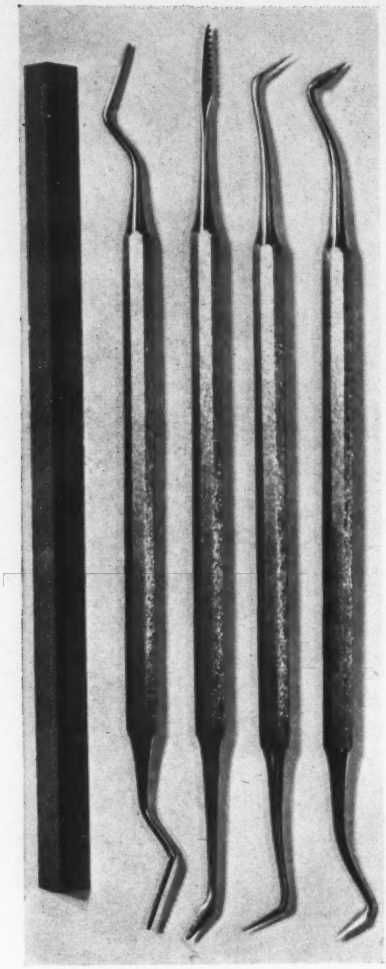


Fig. 5—Instruments and special stone to keep them sharp. The angles of the stone fit into the serrations of the bone file.

time. Sodium amytal, 3 grains, or aspirin, 10 grains, may be occasionally used in the case of the apprehensive or nervous patient.

TECHNIQUE

The technique for the use of the gingivectors is as follows:

1. Start with the lower right side. Use conductive anesthesia aided by a small amount of procaine hydrochloride injected submucously on the buccal and labial.

2. It is highly necessary that the instruments be sharp. Place the blade at the disto-buccal angle of the last tooth, making incision to the tooth.

3. Carry the incision to the lowest point of the pocket or loose tissue and with firm pressure bring the instrument around the teeth, pushing the blade well into the interproximal spaces, and with a lifting motion remove the soft and diseased tissue.

It is possible to feel the good process with the blade and it is desirable not to cut below this area.

4. The surgery may be said to be well done when the blade may be rested against the gums and the operator feels it supported by bone without any resilience in the gum tissue. In other words, the gums should be cut to the edge of the bone, and no further.

5. Proceed on the lingual as on the buccal.

6. The bone is then lightly dressed with the bone files.

7. The roots now being visible are scaled with such simple scalers as the dentist may use in ordinary prophylactic treatment, and further smoothed with fine strips.

8. The final polishing of the teeth with pumice stone and chalk is left until the pack is removed and the gums are fairly well healed.

9. The surgical pack is now prepared. It should be mixed almost to the consistency of putty and formed into short ropes.

10. Apply vaseline to the finger tips and gently press the material into the interproximal spaces. Cover the posterior teeth first, using a continuous rope of the pack so that there is no joint at the heels to cause the pack to crack away. Cover the cut edges well and muscle trim the pack while it is still soft, making sure that it does not get between any loose tissue and the bone and clears the occlusion.

11. I prefer to change the pack in five days. When left on longer a slimy, disagreeable condition often occurs under the pack, which, I believe, retards healing. There is no disadvantage to changing the pack at this time. It takes only a few minutes and gives the patient a grateful sense of cleanliness and healing. This second application is left on for five days.

12. After the pack is removed the patient is supplied with a soft rubber toothbrush which is to be used for a week. Then an old soft bristle brush is used for several days, and finally he is taught the proper use of hard brushes, and the use of rubber bands as dental floss.

13. Traumatic occlusion is checked about ten days after the final pack is removed.

COMMENT

A most difficult part of pyorrhea surgery is combating the patient's resistance to brushing the tender gums after the pack is removed. I tell the patient that the palms of the hands, the soles of the feet, and the gums are made of similar tissue, in that they all are toughened by use. While under treatment, I keep a brush in the office with the patient's name on it and have him use it so that the proper method of brushing (Charter's) is fixed in his mind. Here, indeed, is the most important adjunct in the treatment of pyorrhea by surgery, or any other means, and the patient is emphatically told before treatment is instituted that he will have to do at least 50 per cent of the treatment himself, if he expects to maintain a cure.

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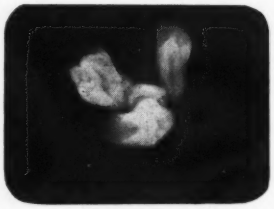
CYSTIC TISSUE SIMILAR TO GUM TISSUE

DOCTOR H. E. SNYDER of Columbus, Nebraska, reports the case of an ovarian dermoid cyst which was composed of dense fibrous tissue similar to gum tissue and contained two fairly well formed teeth and two of a more rudimentary nature. The mass



is shown in the accompanying roentgenogram.

The cyst also contained a considerable quantity of hair.

Cases of this kind have been reported in the medical literature.